

Title VI and NC DEQ Swine CAFOs (REACH) Case

October 17, 2016

ATTACHMENT B

SUMMARY OF DECLARATION REACH TITLE VI COMPLAINT

Ex. #	Date of Declaration	Name	Race/ Ethnicity ¹		# CAFOs/ Radius from Home	Concerns
<i>Exhibits to 9/15/2014 Complaint</i>						
5	8/29/14	Anonymous 1	AA	Duplin	No map	Odors. Spray 3 times per week. Loss of use & enjoyment, no outside entertaining, no walking. Mist in yard & on clothes. Switched from well water. Decreased property values. Watery eyes.
6	8/27/14	Personal Privacy / Ex. 6	W			Riverkeeper/Waterkeeper Alliance. I have participated in water monitoring on Stocking Head Creek, on a 3½ mile stretch of water with more than 30 CAFOs.
7	8/27/14		AA	Duplin	? Hard to tell	Cost for county water. Odors, flies. Loss of use & enjoyment, no cookouts, can't sit on our porch. Windows closed. Use clothes dryer. Has to mow lawn twice a week b/c of nutrients from sprayers. Decreased property values. Can't sell or rent properties.
8	8/30/14		AA	Duplin	8/1.5 miles	Flies. Odors. Loss of use & enjoyment, no cookouts, can't sit on our porch, 4 wheeling. Windows closed. Burn eyes & nose. Sinus infections & nasal problems. Cost for county water. Used to fish & hunt for food. No longer fish in or hunt. Close windows. Hog farm next to Charity Middle School.
9	9/2/14		AA	Duplin	11/2 miles	Well water tested, told can't drink it. Had to buy water until hooked up to county water. Had to pay for hook up.

¹ AA = African American. W= white. H = Hispanic. NT = Native American.

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						Odors. Flies. Loss of use & enjoyment, no cookouts, can't sit on our porch. No clothes outside—extra washing if do. Nausea, runny nose, lung issues,
10	8/30/14	Personal Privacy / Ex. 6	AA	Duplin	5/1 mile	Odor. Loss of use & enjoyment, no cookouts, can't sit on our porch. Waste on cars, clothes, and house. Nausea. Flies. Relatives don't want to visit.
11	8/31/14		AA	Duplin	5/1 mile	Cost for county water. Odor. Loss of use & enjoyment, no cookouts, can't sit on our porch. Burn eyes and nose. Spray residue. Had to buy & use clothes dryer. Flies. Buzzards. Difficulty selling property. Hogs all around church. Clinton smells.
12	8/30/14		AA	Duplin	5/1 mile	Odor. Loss of use & enjoyment, no cookouts, can't sit on our porch, have to exercise inside. Burn eyes and nose. Feel mist. Spray field next door. Keep windows closed. AC cost. Cost of county water.
13	8/30/2014		AA	Duplin	5/1 mile	Child. Odor comes 5-10x per month. Can't play outside. Closest park is too far to drive. Can't BBQ. Hog farms affect where she wants to live when grows up.
15	8/30/14		AA	Duplin	7/1 mile	Poultry facility nearby. Odor for 3 days and flies. Closed windows, can't hang clothes, no activities outside. Municipal water is brown. Sinus problems, ear problems, asthma problems.
16	8/30/14		AA	Duplin	28/2 miles	Works for REACH, an organization devoted to helping communities and effects of hog farming. Knows about people who have suffered terribly living near industrial hog farmers and dealing with hog-related MRSA. Has found that water bodies tested as having E.Coli, MRSA, and other harmful substances have not been added to the state's list of impaired water bodies. Has to eat food inside during meetings because of the flies and bad smell. Can't fish anymore because the fish are starting to have sores on them. Believes the lagoons contaminate the well water and

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						had to hook up to the county water system. Overstuffed dead hog boxes attract birds.
17	4/18/14	Personal Privacy / Ex. 6	AA	Duplin	5/? miles	Many family members are exposed to the odor and harmful pollutants. Waste has blown onto the house and into the storm door and windows. Received verbal/physical threats from farmers. Has to wear a mask walking to car and can't freely exercise. Gets headaches, trouble breathing, and depression from spraying. Can't use well water and has to pay to use county water. Can't hunt or fish.
18	8/29/14		AA	Pender	5/2 miles	Unescapable smell, gets in car. Coughing and draining of eyes. Interferes with church activities by forcing events inside.
19	8/30/14		AA	Duplin	7/1 mile	Home value decreased. Can't sit outside due to spraying. Believes emphysema and use of oxygen tank due to spraying. Can't breathe well. Can't fish. Can't hang-dry clothing. Would like to switch to city water but can't afford it.
20	8/28/14		AA	Duplin	8/1 mile	Horrible smell. Wind/rain blow waste onto home. Can't go outside. Has well water, but has to buy drinking water and drinks about a gallon a day; spends \$5-\$10 a week on bottled water. Can't fish.
21	8/28/14		AA	Sampson	2/? miles	Has issues with well water. Has to buy a Pur water filter and replace the filter monthly. Well water would "fizzle." Ice has an "eggy" smell. Water often comes out brown. Bad smell attracts bugs.
22	8/30/14		AA	Duplin	10/2 miles	Smell from trucks traveling by and can't open house windows due to smell. Hog waste residue is on the house siding. Has severe bronchitis/pneumonia. Lowered house value and can't sell house due to proximity to hog farms.
23	8/30/14		AA	Duplin	10/2 miles	Constant bad smell. She & father have developed a cough due to air pollution. Can't open the house due to smell and gas from sitting, idling trucks. Pays to connect to county water because of poor quality well water. Can't hang-dry

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						clothing. Can't grill outside or spend time outside. Spends \$ on air purifies for the house.
24	8/28/14	Personal Privacy / Ex. 6	AA	Sampson	4/? miles	High blood pressure, thyroid issues, heart conditions, uses oxygen machine. Nephew has regular sneezing/stuffy nose and allergies. Can't have cookouts or go outdoor due to smell. Smell has caused throat and mouth discomfort. Can't hang-dry clothing. Can't fish. Can't have outdoor events at church.
25	8/26/14		AA	Pender	9/3 miles	Smell is so bad can't go outside or use pool. Can't open windows. Can't open windows at church or have events outside. Pays to have county water. Has allergies. People in the area are suspicious why there are so many local cancer patients.
26	8/25/14		H	Sampson	7/? miles	Everyone in school smelled horrible. Clothing would smell and would stink up cars, buses and classrooms. Notices that fishing ponds appear unhealthy. Fish have abrasions/infections and are unable to eat.
27	8/31/14		H	Duplin	8/2 miles	Trucks w/sludge, increasing noise, dust. Child sinus issues. Still uses well water. Buys drinking water. Odor. Spray every 2-3 weeks. Close windows.
28	8/30/14		AA	Duplin	7/1.5 mile 1/5 mi+ ²	Odors. Spray. No longer fish. Stepping in waste outside facilities. Trucks – traffic & smell. Loss of use & enjoyment no walking. Dead boxes.
29	4/17/14		AA	Duplin/ Pender		Odors. Spray. Spray field next door. Keep windows closed. AC cost. Loss of use & enjoyment, no cookouts. Hold breath b/c on crutches when getting mail, going to deep freezer. No clothes outside. Bought dryer. Health issues, sinuses, bronchitis, breathing, sore throat.
30						REACH organizer. No personal statements. Summary descriptions of effects she has seen or heard about.

² Map shows 7 within 1.5 miles, but declaration says 1 within 5 or 6 miles.

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31	8/30/14	Personal Privacy / Ex. 6	AA	Duplin	7/1 mile	Odors. Breathing difficulties. Flies. Loss of use & enjoyment, no cookouts.
32	8/30/14		AA	Duplin	4/1.5 miles	Odors from trucks, fluid from trucks, spray fields. Odors in clothes & hair. Laundromat costs. Odors at church. No more fishing, green stuff grows in the water. Flies. Loss of use & enjoyment, no cookouts. Unclear if source for current drinking water is well or county.
33	8/30/14		?	Duplin	7/1 mile	Odors. Nausea, sinuses, throat, Close windows. No clothes outside, costs of drying clothes. Cost of A/C. Decreased property values. Loss of use & enjoyment, no cookouts, can't sit on our porch. Bad flies for 3 days after spray.
34	8/30/14		AA	Duplin	5/1 mile	Odor. Hunting. Smells closer to spray fields. Well water smells like hog waste. Well water tested 2009 found not safe to drink. Cost of bottled water. Close windows. Loss of use & enjoyment, rarely goes outside.
35	8/23/14		AA	Clinton?	14/3 miles ³	Odors. Sprays 2-3 times per week. Loss of use & enjoyment, rarely lets child go outside. Spray field waste on car.
36	8/30/14		AA	Duplin	12/2 miles	Odors. Close windows. No clothes outside. Loss of use & enjoyment, no cookouts. County water hook up since Hurricane Floyd. Have well water access, but county don't want us to drink it, but won't tell why. Used to fish & hunt for food. No longer fish in or hunt near Stocking Head Creek & Cape Fear River b/c of contamination & dead pigs in water & fish with sores. Have to wear mask when hunting. Increased coughing & high blood pressure.
Exhibits to 4/12/2016 Supplement to Complaint						
1	8/6/15	Personal Privacy / Ex. 6	AA	Duplin	15/3 miles	Spray gets on house and windows. Can't go outside due to smell, and smell is particularly bad when it is windy. Can't

³ Map show 3 mile radius, but also farther.

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						open windows. Smell sometimes comes through air ducts. Has to pay to run A/C due to being unable to open windows during the summer, costing \$50-\$275/month depending on the season. Can't have cookouts. Has trouble breathing when going outside. Bugs and vultures surround dumpsters where pigs are disposed of. Had to pay a \$500 connection fee and \$30-\$45 every month for county water since well-water is contaminated. Water is brown; buys drinking water in 5-gallon drums. Diagnosed with asthma and has to take in haler and oral medication made worse by the hog facilities. Can't fish anymore due to contaminated water and ill fish. Feels the hog facilities affects him mentally/physically.
2	9/20/14	Anonymous 2	AA	Warsaw	5/1 mile	Spray burns eyes. Can't eat outside or hang-dry clothing due to smell. Due to odor has allergies, headaches, uses humidifier and other health issues. Grandchildren couldn't play outside and had runny eyes and sneezing. Had to pay \$500 plus monthly fees to connect to county water due to unsafe well-water. Lower property value.
3	8/12/15	Personal Privacy / Ex. 6	AA	Sampson	10/3 miles	Sinus headache, trouble breathing, itchy eyes. Can't do yardwork or go outside. Prescribed breathing machine, asthma pump and eye drops to treat symptoms which cost \$100 but can't afford it. Husband has kidney disease. Son has sinus problems and wears a respiratory mask to go outside. Son's breathing problems are so bad he can't cut grass so she has to hire someone to do it, which she can't afford. Mosquitos and bugs attracted to spray smell. Animal waste gets on her car and home. Can't afford to sell home because she can't afford to move.
4	8/26/14		AA	Columbus	2/2 miles	Lower property value. On city water but doesn't trust the water quality; water doesn't smell or look clean. Skeptical of drinking water. Doesn't garden due to fear of contaminated groundwater.

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5	8/24/15	Personal Privacy / Ex. 6	AA	Duplin	10/3 miles	Can't go outside. Smell is so bad that you literally can't breathe or open doors/windows. Trucks driving by have horrible smell. Worries that the waste is washing down into his well-water. Even though he thinks his water is contaminated, he still drinks and cooks with it because he doesn't have access to cleaner water since the county has refused to hook up his house. Hog trucks are very noisy and interrupt sleeping. Worries that the air from hog facilities is effecting his health (<i>e.g.</i> , sneezing).
6	8/12/2015		?	Duplin	5/1.5 miles	Can't go outside due to bugs from hog waste and smell. Smell burns eyes and causing itching sensation on skin. Can't open windows due to smell and thinks \$120 electricity bill would be lower if she could. Husband has COPD which costs \$16/month in medications and is made worse by the smell outside.
7	7/29/15		AA	Duplin	4/1 mile	B/c of strong smell from waste and trucks, can't open windows, visit parent's cemetery, and hang clothes out, take walks outside. Sometimes has to re-wash clothes due to strong smell. Breathing problems. Can't fish due to dead/deformed fish in local waters. Thinks hospital visits due to respiratory flare-ups are due to hog-waste pollution. Daughters also had health problems including nose bleeds, sinus draining, anemia, etc.
8	10/27/15		AA	Duplin	5/1 mile	Believes sick sinus syndrome and Sarcoidosis (bacteria in lungs) is related to local hog waste because she didn't have problems breathing before the hog farms. Waste gets on her car, lawn and home. B/c of strong smell, can't have cookouts, open windows, take walks or garden. Can't hang-dry clothing and can't afford a dryer in her home so she has to drive into town to use the laundromat.
9	8/12/15		AA	Duplin	2/3 miles	Due to smell can't go outside, can't hang-dry clothing, can't open windows. Has to run A/C. Flies and other bugs constantly around. Daughter can't go outside due to

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						asthma being triggered by spraying. Eye/nasal allergies have worsened due to spraying. Pays \$23-\$33/monthly to hook up to county water due to contaminated well water. Still has to boil water because it doesn't look or taste right. Can't afford a water cleaner and is upset that he has to pay for county water that still isn't clean enough.
10	10/28/15	Personal Privacy / Ex. 6	AA	Sampson	2/ 0.5 miles	Grandchildren won't visit due to smell at house. Sinus problems. A/C running constantly b/c of smell. Can't sit outside. Visitors ask to stay inside. Can't host or grill outside. Avoids going home due to smell. Wears mask to mow lawn. Well-water is contaminated so spends about \$18/week on bottled water, or about \$900/year. Can't sell home due to smell. Can't fish due to contamination & has to buy fish from grocery store. Believes cancer/sinus infections among local African Americans is unusually high due to spraying.

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ATTACHMENT C

Studies and reports submitted as exhibits to or cited in the Complaint; cited in the disparate impact analysis submitted as an exhibit to the Complaint; or cited Earthjustice 2013 comments on draft Swine Permit.

“*” indicates apparent NC focus.

* Wing, Steve & Johnston, Jill, Dep’t of Epidemiology, Univ. of N.C. at Chapel Hill, *Industrial Hog Operations in North Carolina Disproportionately Impact People of Color* (2014) (**Exhibit 4**)

* Wing, Steve & Johnston, Jill, Dep’t of Epidemiology, Univ. of N.C. at Chapel Hill, *Industrial Hog Operations in North Carolina Disproportionately Impact People of Color* (2015) (**update of Exhibit 4**)

*Wing, Steve et al., *Environmental Injustice in North Carolina’s Hog Industry*, 108 *Envtl. Health Perspectives* 225, 228 (2000), (**Exhibit 52**). (finding that North Carolina’s intensive hog confinement operations are located disproportionately in communities with higher levels of poverty, higher proportions of non-white persons, and higher dependence on wells for household water supply).

* Edwards, B. & Ladd, AE, *Race, Poverty, Political Capacity and the Spatial Distribution of Swine Waste in North Carolina, 1982–1997*, 9 *North Carolina Geogr* 55–77 (2001).

* Stretesky, Paul B. et al., *Environmental Inequity: An Analysis of Large-Scale Hog Operations in 17 States, 1982-1997*, 68 *Rural Soc.* 231 (2003) (finding that between 1982 and 1997 large-scale hog operations in North Carolina were more likely to be sited in areas with a disproportionate number of black residents).

Odors

*Wing S, Horton RA, Marshall SW, Thu K, Tajik M, Schinasi L, et al. 2008. *Air Pollution and Odor in Communities Near Industrial Swine Operations*. *Environ. Health Perspect.* 116:1362-1368. (For approximately 2 weeks, 101 nonsmoking adult volunteers living near industrial swine operations in 16 neighborhoods in eastern North Carolina sat outdoors for 10 min twice daily at preselected times. Participants reported 1,655 episodes of swine odor. In nine neighborhoods, odor was reported on more than half of study-days. The study indicates malodor from swine operations is commonly present in these communities and that the odors reported by neighbors are related to objective environmental measurements and interruption of activities of daily life.)

* Schiffman Susan S. et al., *Quantification of Odors and Odorants from Swine Operations in North Carolina*, 108 Agric. & Forest Meteorology 213 (2001). (neighbors of confinement facilities experienced increased levels of mood disorders including anxiety, depression, and sleep disturbances attributable to exposures to malodorous compounds.)

*Avery, Rachel Horton et al., *Malodor as a Trigger of Stress and Negative Mood in Neighbors of Industrial Hog Operations*, 99 Am. J. Pub. Health Suppl., S610 (2009). (Hog odor, hydrogen sulfide, and semivolatile PM₁₀ are related to stress and negative mood in disproportionately low-income communities near industrial hog operations in eastern North Carolina. Malodor should be considered in studies of health impacts of environmental injustice.)

*Schiffman SS, Sattely Miller EA, Suggs MS, Graham BG. 1995. *The Effect of Environmental Odors Emanating from Commercial Swine Operations on the Mood of Nearby Residents*. Brain Research Bulletin 17:369-375. (neighbors of confinement facilities experienced increased levels of mood disorders including anxiety, depression, and sleep disturbances attributable to exposures to malodorous compounds.)

*Tajik M, Muhammad N, Lowman A, Thu K, Wing S, Grant G. 2008. *Impact of Odor from Industrial Hog Operations on Daily Living Activities*. New Solutions 18:193-205. (75 participants in eastern North Carolina in 2002 and again in 2004 and 2005. Indicates that hog odor limits several leisure time activities and social interactions which could have adverse public health consequences.)

* Avery, Rachel et al., *Odor from Industrial Hog Farming Operations and Mucosal Immune Function in Neighbors*, 59(2) Archives of Env'tl. Health 101 (2004) (finding that swine odor was associated with reduced mucosal immune function among 15 adults living near industrial swine operations in North Carolina).

Air

* Deerhake, Marion et al., *Atmospheric Dispersion and Deposition of Ammonia Gas*, in RTI Int'l, Benefits of Adopting Environmentally Superior Swine Waste Management Technologies in North Carolina: An Environmental and Economic Assessment, at 2-32 to 2-34 (2003), available at http://www.cals.ncsu.edu/waste_mgt/smithfield_projects/phase1report04/appendix%20c-RTI.pdf, (**Exhibit 47**) (modeling rates of ammonia deposition by county). "The greatest deposition occurs in Sampson and Duplin counties." *Id.* at 2-33.

* Mirabelli, Maria C. et al., *Asthma Symptoms Among Adolescents Who Attend Public Schools That Are Located Near Confined Swine Feeding Operations*, 118 Pediatrics e66 (2006) (**Exhibit 42**) (finding students aged 12 to 14 who attended North Carolina public schools within 3 miles of industrial swine facilities reported increased asthma-related symptoms, more doctor-diagnosed asthma, and more asthma-related medical visits compared to peers at other schools).

* Mirabelli, Maria C. et al., *Race, Poverty, and Potential Exposure of Middle-School Students to Air Emissions from Confined Swine Feeding Operations*, 114 *Envtl. Health Perspectives* 591, 595 (2006) (**Exhibit 43**) (finding that North Carolina's swine facilities are located closer to schools enrolling higher percentages of non-white and economically disadvantaged students).

* Schinasi, Leah et al., *Air Pollution, Lung Function, and Physical Symptoms in Communities Near Concentrated Swine Feeding Operations*, 22 *Epidemiology* 208, 208 (2011), (**Exhibit 48**) (measuring pollutants levels and effect on 101 adults living near hog CAFOs in 16 eastern North Carolina communities).

* Sacoby, M. Wilson & Serre, Marc L., *Examination of Atmospheric Ammonia Levels Near Hog CAFOs, Homes, and Schools in Eastern North Carolina*, 41 *Atmospheric Env't* 4977, 4985 (2007), (**Exhibit 49**). (NH₃ weekly average concentrations that were collected using passive diffusion tubes from October 2003 to May 2004 (20 sites) and from July 2004 to October 2004 (23 sites) near community locations in close proximity to hog CAFOs. The results indicate potential zones of exposure for human populations who live or go to school near hog CAFOs.)

* Steve Wing et al., *Air Pollution and Odor in Communities near Industrial Swine Operations*, 116 *Envtl. Health Perspectives* 1362 (2008), (**Exhibit 50**) (study participants living within 1.5 miles of swine factory farm reported altering or ceasing normal daily activities when hydrogen sulfide concentrations, and associated hog odor, were the highest).

* Wing, Steve et al., *Air Pollution from Industrial Swine Operations and Blood Pressure of Neighboring Residents*, 121 *Envtl. Health Perspectives* 92 (2013) (**Exhibit 51**). (Like noise and other repetitive environmental stressors, malodors may be associated with acute blood pressure increases that could contribute to development of chronic hypertension.)

Vanotti, Matias B. & Patrick G. Hunt, *Ammonia Removal from Swine Wastewater Using Immobilized Nitrifiers*, in *Proceedings of the 8th Int'l. Conf. of the FAO ESCORENA Network on Recycling of Agricultural, Municipal and Industrial Residues in Agriculture*, Rennes, France 427, 428 (1998), available at <http://www.ramiran.net/doc98/FIN-ORAL/VANOTTI.pdf>.

Zahn, James A. et al., *Air Pollution from Swine Production Facilities Differing in Waste Management Practice* 3, *Proceedings of the Odors and Emission 2000 Conference* (2000) (listing all types of "emissions released from stored swine manure" mentioned above).

Merchant, James A. et al., *Asthma and Farm Exposures in a Cohort of Rural Iowa Children*, 113 *Envtl. Health Perspectives* 350 (2005) (finding children living on swine farms, including large facilities with more than 500 head, experienced increased rates of asthma compared to non-exposed children; results more pronounced where swine facilities added antibiotics to feed).

Radon, Katja et al., *Environmental Exposure to Confined Animal Feeding Operations and Respiratory Health of Neighboring Residents*, 18 *Epidemiology* 300 (2007) (surveying nearly

7,000 residents of four German towns with high confined livestock operation densities and concluding that such operations “may contribute to the burden of respiratory disease among their neighbors”). (Footnoted in Earthjustice comments on draft permit).

* Walker, John T. et al., *Atmospheric Transport and Wet Deposition of Ammonium in North Carolina*, 34 *Atmospheric Env't* 3,407 (2000). (NH₃ emissions from this source region, primarily evolving from swine and poultry operations, are found to increase NH₄⁺ concentration in precipitation at sites up to ≈80 km away. At the Scotland County (NC36) and Wake County (NC41) sites, mean NH₄⁺ concentrations show increases of at least 44% for weeks during which 25% or more back trajectories are influenced by this source region.)

*Costanza, Jennifer K et al., *Potential Geographic Distribution of Atmospheric Nitrogen Deposition from Intensive Livestock Production in North Carolina, USA*, 398 *Sci. Total Env't* 76, 77 (2008).

* Schiffman, Susan S. et al., *Symptomatic Effects of Exposure to Diluted Air Sampled from a Swine Confinement Atmosphere on Healthy Human Subjects*, 113 *Envtl. Health Perspectives* 567 (2005) (finding that those exposed to diluted swine air for two 1-hour sessions were more likely to report headaches, eye irritation, and nausea than the control group that was exposed to clean air); <http://www.ncbi.nlm.nih.gov/pubmed/15866765>. (Aerial emissions from a swine house at North Carolina State University's field laboratory were diluted to a level that could occur at varying distances downwind from a confined animal feeding operation (CAFO) both within and beyond the property line, and these emissions were delivered to an environmental exposure chamber.)

*Sacoby, M. Wilson & Serre, Marc L. *Use of Passive Samplers to Measure Atmospheric Ammonia Levels in a High-density Industrial Hog Farm Area of Eastern North Carolina*, 41 *Atmospheric Env't* 6,074 (2007). (October 2003 to May 2004 (20 sites) and from July 2004 to October 2004 (23 sites) at varying distances from hog CAFOs in close proximity to homes and schools. Average weekly NH₃ levels were measured. Mean level of 13.8 ppb near homes and schools (<2 km) was 4–12 times greater than ambient background levels (1–3 ppb), reaching as high as 80 ppb. Exposed sites (<2 km from a hog CAFO) had a mean level of 12.8 ppb which was over 2 times higher than the mean level of 5.5 ppb at less exposed sites (>2 km from a hog CAFO).)

Donham K. 1993. *Respiratory Disease Hazards to Workers in Livestock and Poultry Confinement Structures*. *Seminars in Respiratory Medicine* 14:49-59.

Donham K, Reynolds S, Whitten P, Merchant J, Burmeister L, Pependorf W. 1995. *Respiratory Dysfunction in Swine Production Facility Workers: Dose-response Relationships of Environmental Exposures and Pulmonary Function*. *American Journal of Industrial Medicine* 27:405-418.

Donham K, Cumro D, Reynolds S, Merchant J. 2000. *Dose-Response Relationships Between Occupational Aerosol Exposures and Cross-Shift Declines of Lung Function in Poultry Workers: Recommendations for Exposure Limits*. Journal of Occupational and Environmental Medicine 42:260-269.

Donham, KJ. 1990. *Health Effects from Work in Swine Confinement Buildings*. American Journal of Industrial Medicine 17:17-25.

Water

* Anderson, M.E. & Sobsey, M.D. *Detection and Occurrence of Antimicrobially Resistant E. coli in Groundwater on or near Swine Farms in Eastern North Carolina*, 54 Water Sci. & Tech. 211, 217 (2006), (**Exhibit 37**) (“Overall, the results of this study demonstrated that antibiotic-resistant E. coli were present in ground waters associated with commercial swine farms that have anaerobic lagoons and land application systems for swine waste management.”).

*Wendee, Nicole, *CAFOs and Environmental Justice: The Case of North Carolina*, 121 Env'tl. Health Perspectives A182, A186 (2013), (**Exhibit 44**) (“Even without spills, ammonia and nitrates may seep into groundwater, especially in the coastal plain where the water table is near the surface.”).

* Burkholder, JoAnn M. et al., *Impacts of Waste from CAFOs on Water Quality*, 115 Env'tl. Health Perspectives 308, 309 (2007) (**Exhibit 3 to Burkholder Declaration**). (article is part of the mini-monograph “Environmental Health Impacts of Concentrated Animal Feeding Operations: Anticipating Hazards—Searching for Solutions.”)

* Mallin, Michael A. et al., Ctr. for Marine Science Research, Univ. of N.C. at Wilmington, *Effect of Organic and Inorganic Nutrient Loading on Photosynthetic and Heterotrophic Plankton Communities in Blackwater Rivers* (1998), *available at* <http://repository.lib.ncsu.edu/dr/bitstream/1840.4/1880/1/NC-WRRI-315.pdf>;

Hodne, Carol J., Iowa Policy Project, *Concentrating on Clean Water: The Challenge of Concentrated Animal Feeding Operations* 8 (2005), *available at* <http://www.iowapolicyproject.org/2005docs/050406-cafo-fullx.pdf>. 2005docs/050406-cafo-fullx.pdf (identifying “seepage from earthen manure storage structures” as typical pathway for nitrates entering groundwater).

* Burkholder, JoAnn M. & Glasgow, Howard B. *History of Toxic Pfiesteria in North Carolina Estuaries from 1991 to the Present*, 51 Biosci. 827, 833 (2001) (“During acute [Pfiesteria] exposure, fish commonly hemorrhage or develop skin lesions that are diffuse or nonfocal, as well as deep, localized or focal, bleeding sores or ulcerations.”).

* Mallin, Michael A. et al., *Factors Contributing to Hypoxia in Rivers, Lakes, and Streams*, 51 Limnology & Oceanography 690, 699-700 (2006). (Investigated physical, chemical, and biological variables contributing to biochemical oxygen demand (BOD))

in 17 North Carolina lotic and lentic water bodies affected by mild to severe hypoxia.)

* Wing, Steve et al., *The Potential Impact of Flooding on Confined Animal Feeding Operations in Eastern North Carolina*, 110 *Envtl. Health Perspectives* 387, 387 (2002), available at <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1240801/pdf/ehp0110-000387.pdf> (describing how the 15-20 inches of rain dropped by Hurricane Floyd turned eastern North Carolina into a fecal flood zone). The flooding following Hurricane Floyd was not an isolated incident. *Id.* ("In 1996, 22 fecal waste pits were reported to have been ruptured or inundated following flooding from Hurricane Fran, and one major spill was reported following Hurricane Bonnie in 1998.").

* Casteel et al., "Fecal Contamination of Agricultural Soils Before And After Hurricane-Associated Flooding In North Carolina," *J Environ Sci Health A Tox Hazard Subst Environ Eng* 41, no,2 (2006).

Ham, J.M. & Baum, K.A. *Measuring Seepage from Waste Lagoons and Earthen Basins with an Overnight Water Balance Test*, 52 *Am. Soc'y of Agric. And Biological Engineers* 835 (2009) (introducing test capable of producing accurate seepage measurements in single overnight performance).

Ham, J.M. *Seepage losses from animal waste lagoons: A summary of a four year investigation in Kansas*, 45 *Am. Soc'y of Agric. Eng'rs* 983 (2002) (summarizing study performed using earlier variation of water balance method).

Antibiotic Resistance

Casey, Joan A. *High-Density Livestock Operations, Crop Field Application of Manure, and Risk of Community-Associated Methicillin-Resistant Staphylococcus aureus Infection in Pennsylvania*, 173 *J. Am. Med Ass'n: Internal Med.* 1980 (2013).

Ctrs. for Disease Control, U.S. Dep't of Health and Human Servs., *Antibiotic Resistance Threats in the United States, 2013*, at 6 (2013), available at <http://www.cdc.gov/drugresistance/threat-report-2013/pdf/ar-threats-2013-508.pdf>.

Denis, Oliver et al., *Methicillin-Resistant Staphylococcus aureus ST398 in Swine Farm Personnel, Belgium*, 15 *Emerging Infectious Diseases* 1098 (2009) (Belgium).

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* Rinsky JL, Nadimpalli M, Wing S, Hall D, Baron D, Price LB, et al. 2013. *Livestock-Associated Methicillin and Multidrug Resistant Staphylococcus Aureus Is Present Among*

Industrial, Not Antibiotic-Free Livestock Operation Workers in North Carolina. PLoS One 8:e67641.

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cause a reduction in house price up to 9% depending on the number of hogs and their distance from the house. They estimate that the effect of a new hog operation located within one-half mile of a house would decrease the house value by 4.75% if a house is exposed to an intermediate level of manure.)

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Pew Commission on Industrial Farm Animal Production, *Putting Meat on the Table: Industrial Farm Animal Production in America* (2008), available at http://www.ncifap.org/_images/PCIFAPSmry.pdf, (**Exhibit 46**) (describing the rise of industrial animal production in America and the effects on public health and the environment).

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introduces a novel route of exposure to harmful microorganisms and may disseminate these pathogens into the general environment.)

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Donham KJ1, Lee JA, Thu K, Reynolds SJ., *Assessment Of Air Quality At Neighbor Residences In The Vicinity Of Swine Production Facilities.*, *J Agromedicine*. 2006;11(3-4):15-24. doi: 10.1300/J096v11n03_03. <http://www.ncbi.nlm.nih.gov/pubmed/19274894>

(Air sampling was completed on the front lawn of 35 homes neighboring swine farms in Upper Midwest. In swine CAFO area, exceedences of federal recommended limits for hydrogen sulfide in outdoor air were observed in the swine CAFO area. Concentration of hydrogen sulfide exceeded the recommended limits of the ATSDR (30 ppb) for chronic exposure at two of the 12 homes in the CAFO area (17%). Average hydrogen sulfide concentration exceeded the EPA recommended community standards (0.7 ppb). As chronic exposure to hydrogen sulfide may be present in areas of production agriculture, a potential health risk may be present.)

Thorne PS, Ansley AC, Perry SS. *Concentrations of Bioaerosols, Odors, and Hydrogen Sulfide Inside and Downwind From Two Types of Swine Livestock Operations*. *J Occup Environ Hyg.* 2009 Apr;6(4):211-20. doi: 10.1080/15459620902729184

<http://www.ncbi.nlm.nih.gov/pubmed/19177273> (Inhalable particulate matter, endotoxin, odor threshold, hydrogen sulfide, culturable mesophilic bacteria, culturable fungi, and total airborne microbes, along with wind speed, temperature, and humidity were measured at separate mid-sized livestock facilities (one hoop, one confinement) in Central Iowa on 10 occasions over 2 years. Significant differences in contaminants were observed between hoops and confinement buildings

and across seasons for endotoxin, odors, airborne microorganisms, and hydrogen sulfide. Both types of swine operations produced high airborne concentrations of endotoxin, odor, hydrogen sulfide, bacteria, and fungi. Endotoxin and odors were found downwind at concentrations previously associated with adverse health effects)

*Heaney, Christopher D., et al., *Source Tracking Swine Fecal Waste in Surface Water Proximal To Swine Concentrated Animal Feeding Operations*, Science of the Total Environment 511 (2015) 676-683.

Abstract: For one year, surface water samples at up- and downstream sites proximal to swine CAFO lagoon waste land application sites were tested for fecal indicator bacteria (fecal coliforms, *Escherichia coli* and *Enterococcus*) and candidate swine-specific microbial source-tracking (MST) markers (*Bacteroidales* Pig-1-Bac, Pig-2-Bac, and Pig-Bac-2, and methanogen P23-2). Testing of 187 samples showed high fecal indicator bacteria concentrations at both up- and downstream sites. Overall, 40%, 23%, and 61% of samples exceeded state and federal recreational water quality guidelines for fecal coliforms, *E. coli*, and *Enterococcus*, respectively. Pig-1-Bac and Pig-2-Bac showed the highest specificity to swine fecal wastes and were 2.47 (95% confidence interval [CI] = 1.03, 5.94) and 2.30 times (95% CI = 0.90, 5.88) as prevalent proximal down- than proximal upstream of swine CAFOs, respectively. Pig-1-Bac and Pig-2-Bac were also 2.87 (95% CI = 1.21, 6.80) and 3.36 (95% CI = 1.34, 8.41) times as prevalent when 48 hour antecedent rainfall was greater than versus less than the mean, respectively. Results suggest diffuse and overall poor sanitary quality of surface waters where swine CAFO density is high. Pig-1-Bac and Pig-2-Bac are useful for tracking off-site conveyance of swine fecal wastes into surface waters proximal to and downstream of swine CAFOs and during rain events.

*Michael A. Mallin & Matthew R. McIver & Anna R. Robuck & Amanda Kahn Dickens, *Industrial Swine and Poultry Production Causes Chronic Nutrient and Fecal Microbial Stream Pollution*, Water Air Soil Pollut (2015) 226: 407 (on 10 dates during 2013 investigated physical, chemical, and biological pollution of stream waters (Stocking Head Creek & Maxwell Creek, NC) permitted for collectively 108,068 swine & 1,312,500 broiler chickens in a watershed without industrial or municipal point sources of pollution, 67 dwellings yielding 0.03 septic systems/ha, and containing little traditional crop agriculture. Stocking Head Creek is highly polluted by fecal bacteria, by both measures of the NC criteria for impaired waters. Elevated fecal coliform counts occurred during both wet and dry periods indicating it is chronically polluted by fecal bacteria & did not significantly differ between rainy and dry periods, indicating that surface and groundwater pollution occurs independently of stormwater runoff.)

*Arfken, A.M., Mallin, M.A., Cahoon, L.B., Song, B. (2013). *Monitoring Swine Fecal Contamination in the Cape Fear River Watershed Based on the Detection and Quantification of Hog-Specific Bacteroides-Prevotella 16S rRNA Genes*. Report No. 436. Water Resources Research Institute of the University of North Carolina.

*Michael A. Mallin, Mary Grace Lemon, Matthew R. McIver, *Environmental Quality Of Wilmington And New Hanover County Watersheds, 2013*, CMS Report 14-01, Center for Marine

Science University of North Carolina Wilmington, Wilmington, N.C. 28409 (May 2014)
<http://www.uncw.edu/cms/aclab/>

*Michael A. Mallin, Matthew R. McIver, Amanda Kahn Dickens and Anna R. Robuck, Center for Marine Sciences, *University of North Carolina Wilmington Chronic Stream Pollution in a CAFO Rich Watershed in Duplin County, NC* (2013) (in NC Studies folder)

*Harden, Stephen L., USGS Prepared in cooperation with the North Carolina Department of Environment and Natural Resources, Division of Water Resources, *Surface-Water Quality in Agricultural Watersheds of the North Carolina Coastal Plain Associated with Concentrated Animal Feeding Operations*, Scientific Investigations Report 2015–5080 (2015).

Abstract: The effects of concentrated animal feeding operations (CAFOs) on water quality were investigated at 54 agricultural stream sites throughout the North Carolina Coastal Plain during 2012 and 2013. Three general watershed land-use types were examined during the study, including 18 background watersheds with no active CAFOs (BK sites), 18 watersheds with one or more active swine CAFOs but no poultry CAFOs (SW sites), and 18 watersheds with at least one active swine CAFO and one active dry-litter poultry CAFO (SP sites). The watershed drainage areas for these 54 stream sites ranged from 1.2 to 17.5 square miles. Conventional fertilizers used for crop production are the primary source of nutrients at the BK sites. Animal-waste manures represent an additional source of nutrients at the SW and SP study sites. . . . When compared on the basis of land-use type, there was an overall measurable effect of CAFO waste manures on stream water quality for the SW and SP watershed groups. . . . On the basis of the results of this study, land applications of waste manure at swine CAFOs influenced ion and nutrient chemistry in many of the North Carolina Coastal Plain streams that were studied.

*Arun D. Shendrikar, Joette Steger, Hoke Kimball, Wayne Cornelius, Mark Yirka, Robert Bishop and Neil Joyner, *Ambient Atmospheric Ammonia Monitoring Around Hog Farm Industries in North Carolina* (date unknown – likely 2005 or 2006) (conducted by NC DEQ staff. Copy located in NC specific folder. In 1999, the Ambient Monitoring Section of Division of Air Quality (AMS-DAQ) started ammonia monitoring in the light of exponential growth of the regional hog farm industries. “There remains a merit to continue monitoring ammonia for the following reasons:

–It is a well documented fact (through open literature) that agricultural practices have affects on increased ammonia emissions into the environment.”)

*Deanna L. Osmond, Dana L. K. Hoag, Al E. Luloff, Donald W. Meals and Kathy Neas, *Farmers’ Use of Nutrient Management: Lessons from Watershed Case Studies*, Journal of Environmental Quality – Article, Vol. 44 No. 2, p. 382-390 (March 2015).

(Two case studies, one involving field surveys from three nutrient-impaired river basins/watersheds in North Carolina (Neuse, Tar-Pamlico, and Jordan Lake drainage areas). Results indicate farmers generally did not fully apply nutrient management plans or follow basic soil test recommendations even when they had them. Farmers were found to be hesitant to apply N at university-recommended rates because they did not trust the recommendations, viewed abundant N as insurance, or used recommendations made by fertilizer dealers. Exceptions were noted when watershed education, technical support, and funding resources focused on nutrient

management that included easing management demands, actively and consistently working directly with a small group of farmers, and providing significant resource allocations to fund agency personnel and cost-share funds to farmers. Without better dialogue with farmers and meaningful investment in strategies that reward farmers for taking what they perceive as risks relative to nutrient reduction, little progress in true adoption of nutrient management will be made.)

Travis Lee Kleinschmidt, *Modeling hydrogen sulfide emissions: are current swine animal feeding operation regulations effective at protecting against hydrogen sulfide exposure in Iowa?* Dissertation, Univ. of Iowa, 2011. (Models a large swine CAFO using the air quality dispersion model AERMOD and graphs the estimated concentration of hydrogen sulfide of vs. distance from the CAFO. Reading his graph the concentration of hydrogen sulfide at 3 miles is about half that at 2 miles.)

*Yelena Ogneva-Himmelberger *, Liyao Huang and Hao Xin, *CALPUFF and CAFOs: Air Pollution Modeling and Environmental Justice Analysis in the North Carolina Hog Industry*, ISPRS Int. J. Geo-Inf. 2015, 4, 150-171; doi:10.3390/ijgi4010150 (Published: 26 January 2015) (Uses air pollution dispersion model (CALPUFF) to estimate ammonia concentrations at locations downwind of hog CAFOs and to evaluate the disproportionate exposure of children, elderly, whites and minorities to the pollutant in one watershed in North Carolina and compare between 2000 and 2010. Results show that the average ammonia concentrations in hot spots for 2000 and 2010 were 2.5–3-times higher than the average concentration in the entire watershed.)

EPA, Office of Research and Development (ORD), Land Remediation and Pollution Control Division, National Risk Management Research Laboratory, *Detecting and Mitigating the Environmental Impact of Fecal Pathogens Originating from Confined Animal Feeding Operations: Review*, p.3, (2005).

*Ladd AE, Edward B. *Corporate Swine and Capitalist Pigs: A Decade of Environmental Injustice and Protest in North Carolina*. Soc Justice. 2002;29:26–46.

Centers for Disease Control and Prevention 1998. Public Health Issues Related to Concentrated Animal Feeding Operations. Workshop. Washington, DC: National Center for Environmental Health, Centers for Disease Control and Prevention. Available: <http://www.cdc.gov/cafos> [accessed 26 September 2005].;

Donham KJ. The concentration of swine production. Effects on swine health, productivity, human, and the environment. Vet Clinics N Am Food Anim Prac. 2000;16(3):559–597. [PubMed];

National Academy of Sciences 2002. The scientific basis for estimating air emissions from animal feeding operations. Washington, DC: National Academy Press.

Schiffman S, Walker J, Dalton P, Lorig T, Raymer J, Shusterman D, et al. *Potential health effects of odor from animal operations, wastewater treatment, and recycling of byproducts*. J Agromed. 2000;7:7–81.

Burkholder, J. M., Mallin, M. A., Glasgow, H. B., Jr., Larsen, L. M., McIver, M. R., Shank, G. C., Deamer-Melia, N., Briley, D. S., Springer, J., Touchette, B. W., & Hannon, E. K. (1997). *Impacts to a coastal river and estuary from rupture of a swine waste holding lagoon*. Journal of Environmental Quality, 26, 1451–1466.

Telephone Interview with [Personal Privacy / Ex. 6]

November 23, 2016; 9:30 AM – 10:37AM:

Participants: Mary O'Lone (OGC), Daniel Isales (Region III)

On November 15, 2017, Mary O'Lone briefly interviewed [Personal Privacy / Ex. 6] North Carolina. At that time, [Personal Privacy / Ex. 6] indicated that she would be amenable to continuing the interview via telephone; accordingly, arrangements were made to speak to [Personal Privacy / Ex. 6] on this date.

[Personal Privacy / Ex. 6] indicated that she was not a part of, nor had been in communication with, the North Carolina Environmental Justice Network, the Rural Empowerment Association for Community Help (REACH), the Waterkeeper Alliance, Inc., Earthjustice or the University of North Carolina School of Law Center for Civil Rights. She indicated that she identified [Personal Privacy / Ex. 6] specifically as part of the [Personal Privacy / Ex. 6] [Personal Privacy / Ex. 6] said that she was born and raised in the area of [Personal Privacy / Ex. 6] and that she had family in Robeson and Scotland Counties. She grew up at [Personal Privacy / Ex. 6] NC (where her parents still live) and [Personal Privacy / Ex. 6]

Swan Drive:

[Personal Privacy / Ex. 6] remembered when the industrial hog and chicken operations arrived which was around the time she was in middle school (7-8th grade). Once the industrial animal operations started arriving their number grew quickly. She did not recall any notice being provided to the neighbors regarding the influx of industrial animal operations, but she did indicate that her parents were not ones to discuss those sort of matters in front of their children. She recalls that at that time the debate concerning the industrial hog operations centered on impacts on the residents versus the potential for new jobs. The area had once been rural with some manufacturing (e.g., Converse), but the manufacturing plants have been closing down.

Once the farms arrived, the summertime became unbearable outside. As a child she would play outside, and used to be in the yard constantly but once the farms she no longer wanted to. The family used to hang clothes outside in the line previously, but could no longer do so because the smell would permeate the clothing if left outside (the clothesline has since been torn down). At times when in vehicles, she would hit a wave of smell, which made activities such as riding the bus difficult as there would be no air; the odor would eventually pass, but they would put their shirts over their noses until the odor dissipated.

Spraying of the fields were done for the winter crops and for the summer crops. The smells in the winter were not quite as bad. Once the fields were sprayed the odor lingered for a week, week and a half. She said she could not observe any waste lagoons from her house or from the road. There was one hayfield which was in proximity to the house. With respect to spraying, she observed both trucks spraying and a centralized spraying system which would radiate out. She could not recall any runoff from the spray fields, but she said she was not looking for it.

Her parents' house has been and is on county water so there were no increased water costs associated with the influx of the industrial hog operations. Prior to the industrial hog operations, the house always had the windows raised to let the house air out; however, that is not done as often and they have increased their use of air conditioners.

Once the industrial hog operations arrived, there was an increase in flies and buzzards at the house. Family gatherings are now almost always held inside a building. They have smaller get-togethers because no one house is big enough to hold all the family and friends. For the most recent cookout they needed to use 3-4 fans to keep the flies and gnats away. She said the flies were outrageous and the gnats were in your face.

With respect to trucks, she has seen trucks with live pigs and trucks which had just dropped off pigs. She has not seen any trucks with dead pigs, nor any dead boxes. She indicated that one could not stay behind trucks carrying live hogs because of the odor (truck which had just dropped off pigs also retained a strong odor). Based on her observations from driving around the area, she would estimate that there were a couple of trucks a month passing through.

There were no streams or ponds close by which she could walk to for fishing.

Personal Privacy / Ex. 6 recalled what appeared to be difficulties by the owners of the house across from her parents' house that backs onto a spray field in terms of selling it. However, she indicated that there hasn't been any evidence of residents leaving en masse; even within her generation most people stay around (if they move, they move into town, the town over).

She did not recall any health impacts related to the industrial hog operations; there are many smokers in the family so respiratory ailments are related to that. She was not sure if her parents ever reached out to any regulatory authority regarding the impacts from the industrial hog or poultry operation.

Personal Privacy / Ex. 6

She has lived at this residence for the past 8 months. An industrial turkey operation is closest to the **Personal Privacy / Ex. 6** and the owners of that operation also plant corn and other crops so there is constant spraying of waste using trucks. There is a big field close to her house, but she has never had any incidents of overspray. However, because of the how wide the trucks are riding back and forth, she believes they must be spraying beyond the borders. She did note, however, that her husband's grandmother's house is directly next to the fields and she was not sure if they have ever had any impacts from spraying.

When she arrived at the house in April they were preparing the fields and a couple of weeks ago there was spraying in preparation for the winter crops and there were strong, supersaturated odors associated with those activities. She does not believe there has been any spraying since Hurricane Matthew so the smells have not been bad the last couple of weeks. Spraying can happen any day, typically before 8; it can also happen on weekends, although typically not on Sunday. She cannot hang her clothes outside or leave windows open because of the smell.

When asked about trucks transporting live or dead hogs, she said there have not been many trucks passing by since her house is not on a major route.

The residence is served by county water. In terms of pests, flies, gnats and buzzards are bad. She was not sure of any changes in the nearby pond over time. Any gatherings at the residence are inside. Her husband gardens, but there are flies, gnats, and mosquitos outside.

A lot of people just view the impact from the industrial hog operations as a fact of life even though people talk about it all the time. There are several members of the Lumbee tribe who are also swine CAFO owners.

O'Lone, Mary

From: Marianne Engelman Lado <mengelmanlado@earthjustice.org>
Sent: Wednesday, November 30, 2016 8:56 AM
To: Isales, Daniel
Cc: 'Haddix, Elizabeth McLaughlin (emclaugh@email.unc.edu)'; 'Ducharme, Brent'; Alexis Andiman; O'Lone, Mary; Dorka, Lilian; Covington, Jeryl; Farrell, Ericka
Subject: RE: Interview with NC Waterkeepers (REACH Complaint)
Attachments: 11-16-16 Garysburg RD Spraying.pdf; 11-16-16 Garysburg RD with text.pdf; 11-16-16- Garysburg Sprayfield 2.pdf; 11-16-16 Garysburg Sprayfield 3.pdf; 11-16-16- RD Garysburg Edge of Sprayfield.pdf; 11-16-16 RD Garysburg Pooling 2.pdf; 11-16-16 RD Garysburg Pooling 3.pdf; 11-16-16 RD Garysburg Pooling.pdf; 11-16-16 RD Garysburg Sprayfield.pdf; 11-16-16 RD Garysburg Spraying 2.pdf; 11-16-16 RD Truck & Lagoon.pdf

Daniel,

We're confirmed for Friday from 1-3.

Attached please find the photos. Please confirm receipt.

We look forward to receiving the call-in number, as well.

Thanks,

Marianne

Marianne Engelman Lado
Senior Staff Attorney
Earthjustice
48 Wall Street, 19th Floor
New York, NY 10005
T: 212.845.7393
F: 212.918.1556
earthjustice.org

Note: Starting January 1, 2017, I'll be launching a new environmental justice clinic at Yale Law School. Please feel free to reach me at Yale, by cell at **Personal Matters / Ex. 6**



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From: Isales, Daniel [mailto:Isales.Daniel@epa.gov]
Sent: Tuesday, November 29, 2016 1:39 PM
To: Marianne Engelman Lado
Cc: 'Haddix, Elizabeth McLaughlin (emclaugh@email.unc.edu)'; 'Ducharme, Brent'; Alexis Andiman; O'Lone, Mary; Dorka,

Lilian; Covington, Jeryl; Farrell, Ericka

Subject: RE: Interview with NC Waterkeepers (REACH Complaint)

Marianne,

Thank you very much for making the arrangements on short notice-we look forward to talking to you this Friday, 12/2/16, from 1-3PM. We will make the arrangements for the conference call bridge as we intend to record it, if possible (if you have any objection to it being recorded, please let us know). As soon as we have the call-in information, we will send a follow up email.

I had one follow up request regarding your note below-I did not receive the photographs taken by [REDACTED] as an attachment to your email-could you please resend them at your earliest convenience.

Thank you very much, Daniel

Daniel L. Isales (3RC60)
United States Environmental Protection Agency, Region III
Environmental Science Center
701 Mapes Road
Fort Meade, Maryland 20755-5350

(410) 305-3016
Isales.daniel@epa.gov

From: Marianne Engelman Lado [<mailto:mengelmanlado@earthjustice.org>]
Sent: Monday, November 28, 2016 5:32 PM
To: Isales, Daniel <Isales.Daniel@epa.gov>
Cc: 'Haddix, Elizabeth McLaughlin (emclaugh@email.unc.edu)' <emclaugh@email.unc.edu>; 'Ducharme, Brent' <ducharme@email.unc.edu>; Alexis Andiman <aandiman@earthjustice.org>; O'Lone, Mary <OLone.Mary@epa.gov>; Dorka, Lilian <Dorka.Lilian@epa.gov>; Covington, Jeryl <Covington.Jeryl@epa.gov>; Farrell, Ericka <Farrell.Ericka@epa.gov>
Subject: Interview with NC Waterkeepers (REACH Complaint)

Daniel,

Thanks for your email requesting information and times for a telephonic interview with Waterkeeper representatives and North Carolina Riverkeepers ("Waterkeepers").

As you know, juggling schedules in short order can be a challenge, but most of the Waterkeepers can make a call this Friday from 1-3. We're hoping that this time might work for you.

Please let us know and we can confirm the time.

As you know [REDACTED] **Personal Matters / Ex. 6** previously submitted a declaration in support of the Complaint. His declaration was attached to the Complaint as Exhibit 6. In the declaration [REDACTED] **Personal Matters / Ex. 6** describes his experience monitoring and testing waters to determine the concentration of nutrients and bacteria sources of industrial hog operations and other sources of waste in the water, a role played by each of the Waterkeepers who will join the call. The Waterkeepers also monitor industrial hog operations from the air, file and follow up on complaints with DEQ, and have generally worked together with community members to protect the waterways of North

Carolina [Personal Matters / Ex. 6] declaration was also accompanied by multiple photographs and sample water monitoring reports, as well as an unpublished report on Stocking Head Creek by Michael A. Mallin, dated Jan. 28, 2014.

Over time, the Waterkeepers have documented the impact of the operation of industrial swine facilities under the state general permit and, also, the cumulative impacts of swine and poultry waste in eastern North Carolina waterways. We hesitate to send any additional information, given our belief that OCR has more than sufficient evidence to make a finding of discrimination under Title VI and EPA regulations and issue preliminary findings and recommendations. The information attached to and in the body of this email is sent as a supplement in preparation for the interview with the Waterkeepers, with the hope that OCR will be able to discuss this material during the call.

First, attached to this email please find a set of photographs taken by former Neuse Riverkeeper [Personal Matters / Ex. 6]. After the site visit to Garysburg [Personal Matters / Ex. 6] noticed unusual activity involving tanker trucks in connection with a swine facility. The next day, on November 16, 2016, he arranged to fly over the facility, concerned that he had seen an effort to draw down lagoon levels in violation of state permitting requirements. [Personal Matters / Ex. 6] was able to capture an image of the lagoon and trucks, and took other photographs that appear to show a center pivot sprayer land-applying waste onto fields with ponded water, which appear saturated. Waterkeeper reported this potential violation to DEQ, which followed up and issued a notice of violation. Had [Personal Matters / Ex. 6] not been present, noticed the unusual activity, and arranged for a flyover, however, it is highly unlikely that this violation would have been noticed or addressed by DEQ.

Second, [Personal Matters / Ex. 6] will be available to speak about the series of videos that were recently released by Waterkeeper Alliance and North Carolina Riverkeepers capturing the struggle of community members living with the impacts of industrial animal production. Together, Waterkeeper Alliance and its North Carolina counterparts present first-hand accounts of community members, scientific experts and others on the ground, showing the impacts of animal product to public health, quality of life, and local waterways. The nine short videos are listed below:

- o "The True Cost of Industrial Meat Production" -- An overview of what is happening in North Carolina, where industrial animal production has taken the place of family farms.
- o "Wasting Away" -- Highlights the problem of industrial animal waste and how the pork industry is not being held accountable to dispose of it correctly.
- o "Belly Up" -- How waste generated by industrial meat production is decimating North Carolina's waterways and in turn, killing its fish and ecosystems.
- o "Birthright" -- Community members whose families have lived on their properties for generations talk about the heritage of their land and how it has been overtaken by industrial agriculture and animal waste.
- o "Prisoners" -- Residents discuss how they have become prisoners in their own homes due to the impacts of pollution from industrial animal production, which make it nearly impossible for them to enjoy their property.
- o "Mislabelled" -- How the pork industry deceives consumers with its marketing tactics and labeling of its products.
- o "Bullied" -- Duplin County resident Elsie Herring talks about how she has been intimidated and threatened by the pork industry to remain silent about the injustices she and her family faces.
- o "Silenced" -- The pork industry intimidates by bullying and seeking to silence the people most affected by the impacts of its pollution.
- o "The Value of Land" -- The pork industry's refusal to dispose of its waste in a regulated and more sustainable manner has decimated people's property values, making them unable to move.

These videos expand on the recent landmark report and GIS initiative by Waterkeeper Alliance, North Carolina Riverkeeper organizations and Environmental Working Group that shows the location and waste outputs of more than 6,500 swine, cattle and poultry operations throughout North Carolina. (Complainants previously forwarded information on the maps produced by the GIS initiative; available at <http://waterkeeper.org/fields-of-filth-landmark-report-maps-feces-laden-hog-and-chicken-operations-in-north-carolina/>.)

The Waterkeepers can also speak to their recent experience documenting the impacts of Hurricane Matthew and, particularly, the risks posed by lagoons and sprayfields to the waterways in this low lying coastal region, which is susceptible to hurricanes. See Complaint paragraphs 75-78. The North Carolina Riverkeepers conducted flyovers,

documented spraying in advance of the storm (in violation of state permit conditions), and photographed overflows and potential problems at the facilities in the aftermath of the hurricane. See photos at <https://www.flickr.com/photos/waterkeeperalliance/sets/72157673749082442>.

Please let me know if these materials raise any question or if you have questions that you'd like the Waterkeepers to consider in advance of the call. Please also let me know if you plan to circulate a call-in number or whether we should set up the call.

Sincerely,

Marianne

Marianne Engelman Lado
Senior Staff Attorney
Earthjustice
48 Wall Street, 19th Floor
New York, NY 10005
T: 212.845.7393
F: 212.918.1556
earthjustice.org

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Personal Matters / Ex. 6



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Interview with **Personal Privacy / Ex. 6**
12/08/16; 11:00AM

Brent Ducharme, UNC Center for Civil Rights
Elizabeth Haddix, UNC Center for Civil Rights
Mary O'Lone, EPA OGC
Daniel Isales, EPA Region III

Personal Privacy / Ex. 6 In 2007, the NC state legislature passed legislation creating the Lagoon Conversion Program to provide grants to industrial swine operations that wanted to change from open air lagoons to some other waste storage system. The projects were to meet environmental criteria to reduce heavy metals. **Personal Privacy / Ex. 6** selected to serve as the **Personal Privacy / Ex. 6** the Advisory Committee. Other stakeholders on the Advisory Committee were from the pork industry, USDA, NC Soil & Water's Division of Water Resources, and NC State University. Mike Williams from NC State University, who had been tasked to lead the study of innovative technologies pursuant to the Smithfield Consent Decree also participated.

The Advisory Committee was to determine what the grant money could be used for and develop the application process including a scoring matrix was developed to evaluate the applications. While the group started out with hope, it became clear early on that there was not much enthusiasm from the pork council. **Personal Privacy / Ex. 6** was involved for about 5 months and she is not sure if she attended all of the meetings.

She said there wasn't much communication with Advisory Committee members after the initial meetings. By 2008, there was not much push behind the Committee's efforts. She stated that it seemed as though they were crossing off checks to comply with the legislation. She just recently read the Lagoon Conversion Program's 2015 report.

We asked if she happened to have any legislative history for the Lagoon Conversion Program. (We were interested in finding out if there was any discussion that described the justification of why the existing technology of the lagoon spray field should be replaced or why new technologies were needed. We have been unable to find any online or through inter-library loan). **Personal Privacy / Ex. 6** said she was not aware of much legislative history, but would check her records.

Personal Privacy / Ex. 6 mentioned that recently Mike Williams had made public statements that since the time of the Smithfield Report, some or all of the of the innovative technologies studied for the report had become economically feasible.

O'Lone, Mary

From: O'Lone, Mary
Sent: Tuesday, December 13, 2016 9:26 PM
To: Marianne Engelman Lado
Cc: Isales, Daniel; 'Christian Breen'; 'Will Hendrick (whendrick@waterkeeper.org)'
Subject: RE: Follow Up Conversation with Christian Breen

Marianne-

In case we can't do the shared screen (which is looking doubtful), I am sending along some of the questions that I had when looking at the maps & methodology for "Fields of Filth." I want to make sure I understand what I am seeing & as I mentioned I don't think it will take long. If Christian has time, I wanted to give him a chance to look in advance at what I am talking about.

On the Methodology page under Block Map Attributes it says:

- **Total Population:** The total population within the block boundary. Data estimates from the 2010 U.S. Census and various U.S. Census surveys.
- **Percent African American:** The percent of African Americans within the total population of the block boundary. Data estimates from the 2010 U.S. Census and various U.S. Census surveys. . . .

Where are these Block Maps that contain the Block level population data?

Then later in the Methodology under Summary Maps it says: Block Group Map - Animal feeding operation points were aggregated and summarized using 2010 U.S. Census data from the latest American Housing Survey (AHS).

I am assuming that the map entitled "Concentrated Animal Feeding Operations by Census Block Group" is the Block Group Summary Map mentioned above. So on that map, are the different color coded land areas I am looking at Block Groups?

When I click on the southern most dark maroon area in Duplin County (looks roughly like the profile of an airplane) I pull up some population figures (i.e., 2010 U.S. Census -Total Population: 1,224, Pct. African American: 16%, Pct. Native American: 0%, Pct. Hispanic (any race): 7%). Are those population #s that I see for that dark maroon area (i.e., a specific Block Group)?

When I click on See Block Data – what Block data am I seeing? I don't see any population data. So where would I see Block level data that is discussed in the Methodology section? Also, I can't see the boundary of the Block/Block Group on this map or is it there & I am missing it? Is there any way to tell what proportion of the land area of the Block/Block Group I am seeing once I click on See Block Data.

Just curious, but west of the Lumberton airport & northwest of a traffic cloverleaf is a water body labelled as a lagoon in the middle of a flood plain (Waste Lagoon, Lagoon Area: 265,401 sq. ft., Status: within 1,500 ft. of verified lagoon, Within Flood Plain: Yes, Along Impaired Waterway: No, Data Source: EWG). I don't see any swine confinement houses nearby, it isn't the tell tale reddish color, & there don't appear to be outfall pipes going into it. How can you tell it is a waste lagoon?

How frequently are the maps updated and/or what triggers an update?
When was the last update?

Thanks, Mary

Mary O'Lone
Civil Rights and Finance Law Office
Office of General Counsel
US EPA
1200 Pennsylvania Avenue, NW
Washington, DC 20460
(202) 564-4992

From: Marianne Engelman Lado [mailto:mengelmanlado@earthjustice.org]
Sent: Tuesday, December 13, 2016 5:11 PM
To: O'Lone, Mary <OLone.Mary@epa.gov>
Cc: Isales, Daniel <Isales.Daniel@epa.gov>; 'Christian Breen' <cbreen@waterkeeper.org>; 'Will Hendrick (whendrick@waterkeeper.org)' <whendrick@waterkeeper.org>
Subject: RE: Follow Up Conversation with Christian Breen

Thanks.

From: O'Lone, Mary [mailto:OLone.Mary@epa.gov]
Sent: Tuesday, December 13, 2016 4:35 PM
To: Marianne Engelman Lado
Cc: Isales, Daniel; 'Christian Breen'; 'Will Hendrick (whendrick@waterkeeper.org)'
Subject: RE: Follow Up Conversation with Christian Breen

Marianne-

Thanks to all of you for changing the time tomorrow to 10 am to speak with Christian.

The call in number is **Conference Line/Code / Ex. 6**

I will check now about whether we are allowed to do a screen share with Christian.

Thanks, Mary

Mary O'Lone
Civil Rights and Finance Law Office
Office of General Counsel
US EPA
1200 Pennsylvania Avenue, NW
Washington, DC 20460
(202) 564-4992

From: O'Lone, Mary
Sent: Tuesday, December 13, 2016 2:48 PM
To: 'Marianne Engelman Lado' <mengelmanlado@earthjustice.org>
Cc: Isales, Daniel <Isales.Daniel@epa.gov>; 'Christian Breen' <cbreen@waterkeeper.org>; 'Will Hendrick (whendrick@waterkeeper.org)' <whendrick@waterkeeper.org>
Subject: RE: Follow Up Conversation with Christian Breen

Marianne-

I am sorry I didn't get back to you earlier. Dan has a conflict at 10:30, would it be possible to do it from 10 to 10:30?

Thanks, Mary

Mary O'Lone
Civil Rights and Finance Law Office
Office of General Counsel

US EPA
1200 Pennsylvania Avenue, NW
Washington, DC 20460
(202) 564-4992

From: Marianne Engelman Lado [<mailto:mengelmanlado@earthjustice.org>]
Sent: Tuesday, December 13, 2016 2:07 PM
To: O'Lone, Mary <OLone.Mary@epa.gov>
Cc: Isales, Daniel <Isales.Daniel@epa.gov>; 'Christian Breen' <cbreen@waterkeeper.org>; 'Will Hendrick' <whendrick@waterkeeper.org> <whendrick@waterkeeper.org>
Subject: RE: Follow Up Conversation with Christian Breen

Mary,

Are we confirmed for a conversation with Christian and possibly Sorean tomorrow at 10:30? Do you have a call-in number?

Thanks.

Marianne

From: Marianne Engelman Lado
Sent: Wednesday, December 07, 2016 2:15 PM
To: 'O'Lone, Mary'
Cc: Isales, Daniel; Christian Breen; Will Hendrick (whendrick@waterkeeper.org); Alexis Andiman; Ducharme, Brent; Haddix, Elizabeth McLaughlin (emclaugh@email.unc.edu)
Subject: Follow Up Conversation with Christian Breen

Mary,

Next week will work well.

Christian is available on Wednesday morning. Would 10:30 work? Will Hendrick may also join the call.

Christian also suggested that Sorean Ronquist join the call. Sorean is the GIS Director at Environmental Working Group (EWG) and may be helpful on technical questions. Christian worked with Sorean on the mapping project.

Please let me know if 10:30 on Wednesday is convenient for you and we can confirm.

Thanks,

Marianne

Marianne Engelman Lado
Senior Staff Attorney
Earthjustice
48 Wall Street, 19th Floor
New York, NY 10005
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From: O'Lone, Mary [<mailto:OLone.Mary@epa.gov>]
Sent: Wednesday, December 07, 2016 8:40 AM
To: Marianne Engelman Lado
Cc: Isales, Daniel
Subject: FW: Follow Up Conversation with Christian Breen

Marianne-

I am not available Friday & I am the one with the questions.

Can we do it Tuesday or Wednesday week? And can Christian have access to the website so I can show him what my questions are about? I didn't want him to be driving or something.

Thanks, Mary

Mary O'Lone
Civil Rights and Finance Law Office
Office of General Counsel
US EPA
1200 Pennsylvania Avenue, NW
Washington, DC 20460
(202) 564-4992

From: Isales, Daniel
Sent: Tuesday, December 06, 2016 8:18 PM
To: O'Lone, Mary <OLone.Mary@epa.gov>
Subject: FW: Follow Up Conversation with Christian Breen

Are you around or are you out by this Friday?

Daniel L. Isales (3RC60)
United States Environmental Protection Agency, Region III
Environmental Science Center
701 Mapes Road
Fort Meade, Maryland 20755-5350

(410) 305-3016
Isales.daniel@epa.gov

From: Marianne Engelman Lado [<mailto:mengelmanlado@earthjustice.org>]
Sent: Tuesday, December 06, 2016 4:07 PM
To: Isales, Daniel <Isales.Daniel@epa.gov>
Cc: Haddix, Elizabeth McLaughlin (emclaugh@email.unc.edu) <emclaugh@email.unc.edu>; Ducharme, Brent <ducharme@email.unc.edu>; Alexis Andiman <aandiman@earthjustice.org>; Christian Breen <cbreen@waterkeeper.org>
Subject: Follow Up Conversation with Christian Breen

Daniel,

Christian is available on Friday, any time after 11 am. One of the members of the legal team can also join the call.

Thanks,

Marianne

Marianne Engelman Lado
Senior Staff Attorney
Earthjustice
48 Wall Street, 19th Floor
New York, NY 10005
T: 212.845.7393
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Personal Matters / Ex. 6



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Interview regarding Fields of Filth Mapping Tool

12/14/16; 10AM

Christian Breen, Field Specialist, Waterkeeper Alliance

Will Hendrick, Waterkeeper, Pure Farms, Pure Waters North Carolina Campaign Manager

Tina Sigurdson, Assistant General Counsel, Environmental Working Group (EWG)

Soren Rundquist, Director of Spatial Analysis, EWG

Marianne Engelman Lado, Earthjustice

Mary O'Lone, EPA OGC

Daniel Isales, EPA Region III

EWG and Waterkeepers created a series of interactive maps called Fields of Filth available on the internet (<http://www.ewg.org/research/exposing-fields-filth>) "to enable citizens, lawmakers and policymakers to visualize and interpret the state's swine, poultry and cattle operations by zooming in on selected areas." The maps display a variety of federal demographic data and state geographical data, and analyze high-resolution aerial photography. "The aerial images allowed researchers to quantify the length and breadth of pig waste pits, and to determine the locations and numbers of barns at poultry operations. The researchers drew on government and academic data to supplement these analyses."

The email attached below was sent in advance with questions and topics for discussion. The purpose of this interview was to understand the data displayed, particularly the demographic data, to help determine what if any evidentiary use information displayed might have for OCR. The level of granularity (*e.g.*, block group, block) of the demographic data was not clear from the descriptions on the website at that time. While some displays indicated the information was Census block information, it turns out that all demographic data was in fact Census block group data. During the course of the discussion, EWG indicated it may change displays to make that more clear.

At the beginning of the interview, we were all connected to a common screen in the Fields of Filth mapping tool so that we could walk through the maps and data at the same time.

Soren Rundquist explained the delineation of block group-statistics in pop-ups are based on the American Community Survey from 2015. When looking at the map, it may display more land area than is in the Census block group, but the CAFO operations outside of boundary for that Census block group are not counted in the data listed in pop out display of facts and figures. In order to put together the study, they procured geo-referenced points from NC DEQ called lagoons and used that to digitize lagoons. This information was presumed correct-it was not verified.

Christian Breen explained that the project highlights information not publicly available from the state. – specifically the locations of poultry CAFOs. He stated that they did the state's work by determining and displaying the size and locations of poultry CAFOs. EWG digitized the locations of poultry CAFOs. Until recently, poultry CAFO locations were not known to NC DEQ. He said NC DEQ requested EWG's data set. He said many facilities exist in proximity to low income communities and minority populations.

Soren Rundquist explained that they collected geocoded locations and overflight information. With respect to the display of information of flooding impacts from Hurricane Matthew, they documented flooding in real time

with aerial photography. A green airplane icon in one of the maps indicated a confirmed location of a flooded or inundated CAFO.

Christian Breen stated that their photos are geostamped. He said that even though they cannot manipulate the metadata of their photographs and video, historically, NC DEQ has not accepted these as evidence because it doesn't have the political will to use them. However, other departments within NC DEQ have requested poultry information (will forward email from state).

Soren Rundquist stated that the information on the amount of agricultural land within one mile of a CAFO is from the USDA's cropland data layer. He said displaying this information is important because it shows the lopsided amount of waste applied to available cropland. Swine waste is generally applied to land in close proximity to the waste lagoons. He stated that the amount of cropland may be an underrepresentation because not all of that land is actually used for swine waste application. It could be used for agricultural uses in which the swine waste is not used. He stated that this is a concern because the more saturated the land, the more likely it is for pollutants to enter the water.

Christian Breen thought that NC DEQ should know what is adjacent to the swine CAFOs (such as the poultry facilities) and take that into account, but it doesn't. With concentration of swine and poultry facilities the state is exceeding the carrying capacity of the land and waterways.

They pointed out Stocking Head Creek which Waterkeepers has been working to get listed by NC DEQ as impaired under the Clean Water Act. It has high pollutant levels. There is one household along the creek with a septic system and many swine CAFOs.

Soren Rundquist has not visited a field in North Carolina which is not ditched and drained because otherwise it would be under water. He stated they estimated of 14,000 birds per barn which he believes is a very conservative estimate and that frequently there are up to 25,000 birds per barn. They will update the Fields of Filth maps annually as data sets are updated.

O'Lone, Mary

From: O'Lone, Mary
Sent: Tuesday, December 13, 2016 9:26 PM
To: Marianne Engelman Lado
Cc: Isales, Daniel; 'Christian Breen'; 'Will Hendrick (whendrick@waterkeeper.org)'
Subject: RE: Follow Up Conversation with Christian Breen

Marianne-

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How frequently are the maps updated and/or what triggers an update? When was the last update?

Thanks, Mary

Mary O'Lone
Civil Rights and Finance Law
Office Office of General
Counsel
US EPA
1200 Pennsylvania Avenue,
NW Washington, DC 20460
(202) 564-4992

O'Lone, Mary

From: Dorka, Lilian
Sent: Thursday, December 22, 2016 1:23 PM
To: O'Lone, Mary; Packard, Elise; Shenkman, Ethan
Cc: Isales, Daniel; Temple, Kurt; Wilson, Adam
Subject: Re: REACH - updated draft letter, but did not send it out.
Attachments: draft REACH LOC to NC DEQ 2016 DORKA ADDITIONAL COMMENTS TO LATEST DRAFT 12-22-16.docx

Importance: High

Thanks for incorporating all of my comments Mary! I have just a few more comments - most minor. I will send tis to Chris Robbins and copy the folks in ORD with who you have been working, to get their read and concurrence on the language we have in the letter referring to ORD's review of the studies. Also, I think I need to send a draft for review to Region 4 sooner rather than later. Maybe I should send this draft and make clear that Ethan has not commented and ORD has not verified the statements attributed to them? Anyone have concerns?

Finally, I am copying Ethan on this because I think this version is much easier to read and comment on than the version he has.

Thanks! Lilian

From: O'Lone, Mary
Sent: Wednesday, December 21, 2016 8:17 PM
To: Dorka, Lilian; Packard, Elise
Cc: Isales, Daniel; Temple, Kurt; Wilson, Adam
Subject: REACH - updated draft letter, but did not send it out.

Lilian-

I have not heard back from Ethan or CRD. I am asking Elise (by putting her on this email) to see if she can figure out tomorrow or Friday if Ethan has any comments before you send it to R4. I do not know exactly where we wound up on recommendations and if we want them what we think they might say (see my long winded note below).

Therefore, I have not circulated this to ORD. Plus I think it would be better coming from you to the ORD DCRO (ccing Leila Lackey & Robert Fegley – they are the ones who sent me the document I am quoting/paraphrasing).

I did send this updated draft to CRD, b/c I have no idea is anyone has looked at the past one or plans to look at this one.

Attorney Client / Ex. 5

Attorney Client / Ex. 5

Attorney Client / Ex. 5

You know how to reach me. Have a great holiday.
Thanks, Mary

Mary M. O'Lone
Civil Rights and Finance Law Office
Office of General Counsel
US EPA

1200 Pennsylvania Avenue, NW
Washington, DC 20460
(202) 564-4992

O'Lone, Mary

From: Dorka, Lilian
Sent: Thursday, December 22, 2016 1:38 PM
To: Robbins, Chris
Cc: Lackey, Leila; Fegley, Robert; O'Lone, Mary; Packard, Elise; Isales, Daniel; Temple, Kurt; Covington, Jeryl
Subject: NEED YOUR ASSISTANCE WITH REVIEW OF OCR LETTER OF CONCERN TO BE SENT TO NC DEQ REGRDING SWINE OPERATION CASE.
Attachments: draft REACH LOC to NC DEQ 2016 DORKA ADDITIONAL COMMENTS TO LATEST DRAFT 12-22-16.docx
Importance: High

Hi Chris, hope you are doing well! First, I want to thank you as well as Leila Lackey and Robert Fegley for ORD's assistance and support as we investigate and try to resolve this high priority case involving NC DEQ's administration of the swine feeding operations in their state.

Deliberative Process / Ex. 5

Deliberative Process / Ex. 5

I am asking for your further assistance in reviewing the attached draft letter and the references to ORD and ORD information. I would greatly appreciate your help and comments on this. Again, thank you and hope you have a wonderful Holiday! Lilian

O'Lone, Mary

From: Robbins, Chris
Sent: Thursday, December 29, 2016 11:19 AM
To: Dorka, Lilian
Cc: Lackey, Leila; Fegley, Robert; O'Lone, Mary; Packard, Elise; Isales, Daniel; Temple, Kurt; Covington, Jeryl; Deener, Kathleen; Kavlock, Robert
Subject: RE: NEED YOUR ASSISTANCE WITH REVIEW OF OCR LETTER OF CONCERN TO BE SENT TO NC DEQ REGRDING SWINE OPERATION CASE.
Attachments: draft REACH LOC to NC DEQ 2016 DORKA ADDITIONAL COMMENTS TO LATEST DRAF....docx

Hi Lilian,

Thank you for the opportunity to review the draft Letter of Concern. We met with our folks this morning and based on our discussion have made some revisions. Attached please find those edits/comments, **Deliberative Process / Ex. 5**

Deliberative Process / Ex. 5

Should you have any questions, please don't hesitate to contact me or have your staff contact Leila Lackey at 202-564-5957.

Thanks and have a great weekend!

Chris

Chris Robbins
Deputy Assistant Administrator for Management (Acting)
Office of Research and Development

Personal Matters / Ex. 6

(202) 564-6141

robbins.chris@epa.gov

From: Dorka, Lilian
Sent: Thursday, December 22, 2016 1:38 PM
To: Robbins, Chris <Robbins.Chris@epa.gov>
Cc: Lackey, Leila <Lackey.Leila@epa.gov>; Fegley, Robert <Fegley.Robert@epa.gov>; O'Lone, Mary <OLone.Mary@epa.gov>; Packard, Elise <Packard.Elise@epa.gov>; Isales, Daniel <Isales.Daniel@epa.gov>; Temple, Kurt <Temple.Kurt@epa.gov>; Covington, Jeryl <Covington.Jeryl@epa.gov>
Subject: NEED YOUR ASSISTANCE WITH REVIEW OF OCR LETTER OF CONCERN TO BE SENT TO NC DEQ REGRDING SWINE OPERATION CASE.
Importance: High

Hi Chris, hope you are doing well! First, I want to thank you as well as Leila Lackey and Robert Fegley for ORD's assistance and support as we investigate and try to resolve this high priority case involving NC DEQ's administration of the swine feeding operations in their state. **Deliberative Process / Ex. 5**

Deliberative Process / Ex. 5

I am asking for your further assistance in reviewing the attached draft letter and the references to ORD and ORD information. I would greatly appreciate your help and comments on this. Again, thank you and hope you have a wonderful Holiday! Lilian

ATTACHMENT B

SUMMARY OF DECLARATION REACH TITLE VI COMPLAINT

Ex. #	Date of Declaration	Name	Race/ Ethnicity ¹		# CAFOs/ Radius from Home	Concerns
<i>Exhibits to 9/15/2014 Complaint</i>						
5	8/29/14	Anonymous 1	AA	Duplin	No map	Odors. Spray 3 times per week. Loss of use & enjoyment, no outside entertaining, no walking. Mist in yard & on clothes. Switched from well water. Decreased property values. Watery eyes.
6	8/27/14	Citizen Name / Ex. 6	W			Riverkeeper/Waterkeeper Alliance. I have participated in water monitoring on Stocking Head Creek, on a 3½ mile stretch of water with more than 30 CAFOs.
7	8/27/14		AA	Duplin	? Hard to tell	Cost for county water. Odors, flies. Loss of use & enjoyment, no cookouts, can't sit on our porch. Windows closed. Use clothes dryer. Has to mow lawn twice a week b/c of nutrients from sprayers. Decreased property values. Can't sell or rent properties.
8	8/30/14		AA	Duplin	8/1.5 miles	Flies. Odors. Loss of use & enjoyment, no cookouts, can't sit on our porch, 4 wheeling. Windows closed. Burn eyes & nose. Sinus infections & nasal problems. Cost for county water. Used to fish & hunt for food. No longer fish in or hunt. Close windows. Hog farm next to Charity Middle School.
9	9/2/14		AA	Duplin	11/2 miles	Well water tested, told can't drink it. Had to buy water until hooked up to county water. Had to pay for hook up. Odors. Flies. Loss of use & enjoyment, no cookouts, can't sit on our porch. No clothes outside—extra washing if do. Nausea, runny nose, lung issues,

¹ AA = African American. W= white. H = Hispanic. NT = Native American.

Ex. #	Date of Declaration	Name	Race/ Ethnicity ¹		# CAFOs/ Radius from Home	Concerns
10	8/30/14	Citizen Name / Ex. 6	AA	Duplin	5/1 mile	Odor. Loss of use & enjoyment, no cookouts, can't sit on our porch. Waste on cars, clothes, and house. Nausea. Flies. Relatives don't want to visit.
11	8/31/14		AA	Duplin	5/1 mile	Cost for county water. Odor. Loss of use & enjoyment, no cookouts, can't sit on our porch. Burn eyes and nose. Spray residue. Had to buy & use clothes dryer. Flies. Buzzards. Difficulty selling property. Hogs all around church. Clinton smells.
12	8/30/14		AA	Duplin	5/1 mile	Odor. Loss of use & enjoyment, no cookouts, can't sit on our porch, have to exercise inside. Burn eyes and nose. Feel mist. Spray field next door. Keep windows closed. AC cost. Cost of county water.
13	8/30/2014		AA	Duplin	5/1 mile	Child. Odor comes 5-10x per month. Can't play outside. Closest park is too far to drive. Can't BBQ. Hog farms affect where she wants to live when grows up.
15	8/30/14		AA	Duplin	7/1 mile	Poultry facility nearby. Odor for 3 days and flies. Closed windows, can't hang clothes, no activities outside. Municipal water is brown. Sinus problems, ear problems, asthma problems.
16	8/30/14		AA	Duplin	28/2 miles	Works for REACH, an organization devoted to helping communities and effects of hog farming. Knows about people who have suffered terribly living near industrial hog farmers and dealing with hog-related MRSA. Has found that water bodies tested as having E.Coli, MRSA, and other harmful substances have not been added to the state's list of impaired water bodies. Has to eat food inside during meetings because of the flies and bad smell. Can't fish anymore because the fish are starting to have sores on them. Believes the lagoons contaminate the well water and had to hook up to the county water system. Overstuffed dead hog boxes attract birds.
17	4/18/14		AA	Duplin	5/? miles	Many family members are exposed to the odor and harmful pollutants. Waste has blown onto the house and into the

Ex. #	Date of Declaration	Name	Race/ Ethnicity ¹		# CAFOs/ Radius from Home	Concerns
		Citizen Name / Ex. 6				storm door and windows. Received verbal/physical threats from farmers. Has to wear a mask walking to car and can't freely exercise. Gets headaches, trouble breathing, and depression from spraying. Can't use well water and has to pay to use county water. Can't hunt or fish.
18	8/29/14		AA	Pender	5/2 miles	Unescapable smell, gets in car. Coughing and draining of eyes. Interferes with church activities by forcing events inside.
19	8/30/14		AA	Duplin	7/1 mile	Home value decreased. Can't sit outside due to spraying. Believes emphysema and use of oxygen tank due to spraying. Can't breathe well. Can't fish. Can't hang-dry clothing. Would like to switch to city water but can't afford it.
20	8/28/14		AA	Duplin	8/1 mile	Horrible smell. Wind/rain blow waste onto home. Can't go outside. Has well water, but has to buy drinking water and drinks about a gallon a day; spends \$5-\$10 a week on bottled water. Can't fish.
21	8/28/14		AA	Sampson	2/? miles	Has issues with well water. Has to buy a Pur water filter and replace the filter monthly. Well water would "fizzle." Ice has an "eggy" smell. Water often comes out brown. Bad smell attracts bugs.
22	8/30/14		AA	Duplin	10/2 miles	Smell from trucks traveling by and can't open house windows due to smell. Hog waste residue is on the house siding. Has severe bronchitis/pneumonia. Lowered house value and can't sell house due to proximity to hog farms.
23	8/30/14		AA	Duplin	10/2 miles	Constant bad smell. She & father have developed a cough due to air pollution. Can't open the house due to smell and gas from sitting, idling trucks. Pays to connect to county water because of poor quality well water. Can't hang-dry clothing. Can't grill outside or spend time outside. Spends \$ on air purifies for the house.
24	8/28/14		AA	Sampson	4/? miles	High blood pressure, thyroid issues, heart conditions, uses oxygen machine. Nephew has regular sneezing/stuffy nose

Ex. #	Date of Declaration	Name	Race/ Ethnicity ¹		# CAFOs/ Radius from Home	Concerns
						and allergies. Can't have cookouts or go outdoor due to smell. Smell has caused throat and mouth discomfort. Can't hang-dry clothing. Can't fish. Can't have outdoor events at church.
25	8/26/14	Citizen Name / Ex. 6	AA	Pender	9/3 miles	Smell is so bad can't go outside or use pool. Can't open windows. Can't open windows at church or have events outside. Pays to have county water. Has allergies. People in the area are suspicious why there are so many local cancer patients.
26	8/25/14		H	Sampson	7/? miles	Everyone in school smelled horrible. Clothing would smell and would stink up cars, buses and classrooms. Notices that fishing ponds appear unhealthy. Fish have abrasions/infections and are unable to eat.
27	8/31/14		H	Duplin	8/2 miles	Trucks w/sludge, increasing noise, dust. Child sinus issues. Still uses well water. Buys drinking water. Odor. Spray every 2-3 weeks. Close windows.
28	8/30/14		AA	Duplin	7/1.5 mile 1/5 mi+ ²	Odors. Spray. No longer fish. Stepping in waste outside facilities. Trucks – traffic & smell. Loss of use & enjoyment no walking. Dead boxes.
29	4/17/14		AA	Duplin/ Pender		Odors. Spray. Spray field next door. Keep windows closed. AC cost. Loss of use & enjoyment, no cookouts. Hold breath b/c on crutches when getting mail, going to deep freezer. No clothes outside. Bought dryer. Health issues, sinuses, bronchitis, breathing, sore throat.
30						REACH organizer. No personal statements. Summary descriptions of effects she has seen or heard about.
31	8/30/14		AA	Duplin	7/1 mile	Odors. Breathing difficulties. Flies. Loss of use & enjoyment, no cookouts.
32	8/30/14		AA	Duplin	4/1.5 miles	Odors from trucks, fluid from trucks, spray fields. Odors in clothes & hair. Laundromat costs. Odors at church. No

² Map shows 7 within 1.5 miles, but declaration says 1 within 5 or 6 miles.

Ex. #	Date of Declaration	Name	Race/ Ethnicity ¹		# CAFOs/ Radius from Home	Concerns
						more fishing, green stuff grows in the water. Flies. Loss of use & enjoyment, no cookouts. Unclear if source for current drinking water is well or county.
33	8/30/14	Citizen Name / Ex. 6	?	Duplin	7/1 mile	Odors. Nausea, sinuses, throat, Close windows. No clothes outside, costs of drying clothes. Cost of A/C. Decreased property values. Loss of use & enjoyment, no cookouts, can't sit on our porch. Bad flies for 3 days after spray.
34	8/30/14		AA	Duplin	5/1 mile	Odor. Hunting. Smells closer to spray fields. Well water smells like hog waste. Well water tested 2009 found not safe to drink. Cost of bottled water. Close windows. Loss of use & enjoyment, rarely goes outside.
35	8/23/14		AA	Clinton?	14/3 miles ³	Odors. Sprays 2-3 times per week. Loss of use & enjoyment, rarely lets child go outside. Spray field waste on car.
36	8/30/14		AA	Duplin	12/2 miles	Odors. Close windows. No clothes outside, Loss of use & enjoyment, no cookouts. County water hook up since Hurricane Floyd. Have well water access, but county don't want us to drink it, but won't tell why. Used to fish & hunt for food. No longer fish in or hunt near Stocking Head Creek & Cape Fear River b/c of contamination & dead pigs in water & fish with sores. Have to wear mask when hunting. Increased coughing & high blood pressure.
Exhibits to 4/12/2016 Supplement to Complaint						
1	8/6/15	Citizen Name / Ex. 6	AA	Duplin	15/3 miles	Spray gets on house and windows. Can't go outside due to smell, and smell is particularly bad when it is windy. Can't open windows. Smell sometimes comes through air ducts. Has to pay to run A/C due to being unable to open windows during the summer, costing \$50-\$275/month

³ Map show 3 mile radius, but also farther.

Ex. #	Date of Declaration	Name	Race/ Ethnicity ¹		# CAFOs/ Radius from Home	Concerns
						depending on the season. Can't have cookouts. Has trouble breathing when going outside. Bugs and vultures surround dumpsters where pigs are disposed of. Had to pay a \$500 connection fee and \$30-\$45 every month for county water since well-water is contaminated. Water is brown; buys drinking water in 5-gallon drums. Diagnosed with asthma and has to take in haler and oral medication made worse by the hog facilities. Can't fish anymore due to contaminated water and ill fish. Feels the hog facilities affects him mentally/physically.
2	9/20/14	Anonymous 2	AA	Warsaw	5/1 mile	Spray burns eyes. Can't eat outside or hang-dry clothing due to smell. Due to odor has allergies, headaches, uses humidifier and other health issues. Grandchildren couldn't play outside and had runny eyes and sneezing. Had to pay \$500 plus monthly fees to connect to county water due to unsafe well-water. Lower property value.
3	8/12/15	Citizen Name / Ex. 6	AA	Sampson	10/3 miles	Sinus headache, trouble breathing, itchy eyes. Can't do yardwork or go outside. Prescribed breathing machine, asthma pump and eye drops to treat symptoms which cost \$100 but can't afford it. Husband has kidney disease. Son has sinus problems and wears a respiratory mask to go outside. Son's breathing problems are so bad he can't cut grass so she has to hire someone to do it, which she can't afford. Mosquitos and bugs attracted to spray smell. Animal waste gets on her car and home. Can't afford to sell home because she can't afford to move.
4	8/26/14		AA	Columbus	2/2 miles	Lower property value. On city water but doesn't trust the water quality; water doesn't smell or look clean. Skeptical of drinking water. Doesn't garden due to fear of contaminated groundwater.
5	8/24/15		AA	Duplin	10/3 miles	Can't go outside. Smell is so bad that you literally can't breathe or open doors/windows. Trucks driving by have horrible smell. Worries that the waste is washing down

Ex. #	Date of Declaration	Name	Race/ Ethnicity ¹		# CAFOs/ Radius from Home	Concerns
						into his well-water. Even though he thinks his water is contaminated, he still drinks and cooks with it because he doesn't have access to cleaner water since the county has refused to hook up his house. Hog trucks are very noisy and interrupt sleeping. Worries that the air from hog facilities is effecting his health (e.g., sneezing).
6	8/12/2015	Citizen Name / Ex. 6	?	Duplin	5/1.5 miles	Can't go outside due to bugs from hog waste and smell. Smell burns eyes and causing itching sensation on skin. Can't open windows due to smell and thinks \$120 electricity bill would be lower if she could. Husband has COPD which costs \$16/month in medications and is made worse by the smell outside.
7	7/29/15		AA	Duplin	4/1 mile	B/c of strong smell from waste and trucks, can't open windows, visit parent's cemetery, and hang clothes out, take walks outside. Sometimes has to re-wash clothes due to strong smell. Breathing problems. Can't fish due to dead/deformed fish in local waters. Thinks hospital visits due to respiratory flare-ups are due to hog-waste pollution. Daughters also had health problems including nose bleeds, sinus draining, anemia, etc.
8	10/27/15		AA	Duplin	5/1 mile	Believes sick sinus syndrome and Sarcoidosis (bacteria in lungs) is related to local hog waste because she didn't have problems breathing before the hog farms. Waste gets on her car, lawn and home. B/c of strong smell, can't have cookouts, open windows, take walks or garden. Can't hang-dry clothing and can't afford a dryer in her home so she has to drive into town to use the laundromat.
9	8/12/15		AA	Duplin	2/3 miles	Due to smell can't go outside, can't hang-dry clothing, can't open windows. Has to run A/C. Flies and other bugs constantly around. Daughter can't go outside due to asthma being triggered by spraying. Eye/nasal allergies have worsened due to spraying. Pays \$23-\$33/monthly to hook up to county water due to contaminated well

Ex. #	Date of Declaration	Name	Race/ Ethnicity ¹		# CAFOs/ Radius from Home	Concerns
						water. Still has to boil water because it doesn't look or taste right. Can't afford a water cleaner and is upset that he has to pay for county water that still isn't clean enough.
10	10/28/15	Citizen Name / Ex. 6	AA	Sampson	2/ 0.5 miles	Grandchildren won't visit due to smell at house. Sinus problems. A/C running constantly b/c of smell. Can't sit outside. Visitors ask to stay inside. Can't host or grill outside. Avoids going home due to smell. Wears mask to mow lawn. Well-water is contaminated so spends about \$18/week on bottled water, or about \$900/year. Can't sell home due to smell. Can't fish due to contamination & has to buy fish from grocery store. Believes cancer/sinus infections among local African Americans is unusually high due to spraying.

Studies Related to Swine CAFOs (* indicates apparent NC focus)

Studies submitted as Exhibits

*Steve Wing & Jill Johnston, Dep't of Epidemiology, Univ. of N.C. at Chapel Hill, *Industrial Hog Operations in North Carolina Disproportionately Impact People of Color* (2014) attached as **Exhibit 4**.

*Marion Deerhake et al., *Atmospheric Dispersion and Deposition of Ammonia Gas*, in RTI Int'l, *Benefits of Adopting Environmentally Superior Swine Waste Management Technologies in North Carolina: An Environmental and Economic Assessment*, at 2-32 to 2-34 (2003), available at http://www.cals.ncsu.edu/waste_mgt/smithfield_projects/phase1report04/appendix%20c-RTI.pdf, attached as **Exhibit 47** (modeling rates of ammonia deposition by county). "The greatest deposition occurs in Sampson and Duplin counties." *Id.* at 2-33.

*Maria C. Mirabelli et al., *Asthma Symptoms Among Adolescents Who Attend Public Schools That Are Located Near Confined Swine Feeding Operations*, 118 *Pediatrics* e66 (2006), attached as **Exhibit 42** (finding students aged 12 to 14 who attended North Carolina public schools within 3 miles of industrial swine facilities reported increased asthma-related symptoms, more doctor-diagnosed asthma, and more asthma-related medical visits compared to peers at other schools).

*Maria C. Mirabelli et al., *Race, Poverty, and Potential Exposure of Middle-School Students to Air Emissions from Confined Swine Feeding Operations*, 114 *Envtl. Health Perspectives* 591, 595 (2006), attached as **Exhibit 43** (finding that North Carolina's swine facilities are located closer to schools enrolling higher percentages of non-white and economically disadvantaged students).

*Leah Schinasi et al., *Air Pollution, Lung Function, and Physical Symptoms in Communities Near Concentrated Swine Feeding Operations*, 22 *Epidemiology* 208, 208 (2011), attached as **Exhibit 48** (measuring pollutants levels and effect on 101 adults living near hog CAFOs in 16 eastern North Carolina communities).

*Sacoby M. Wilson & Marc L. Serre, *Examination of Atmospheric Ammonia Levels Near Hog CAFOs, Homes, and Schools in Eastern North Carolina*, 41 *Atmospheric Env't* 4977, 4985 (2007), attached as **Exhibit 49**.

*Steve Wing et al., *Air Pollution and Odor in Communities Near Industrial Swine Operations*, 116 *Envtl. Health Perspectives* 1362 (2008), attached as **Exhibit 50** (study participants living within 1.5 miles of swine factory farm reported altering or ceasing normal daily activities when hydrogen sulfide concentrations, and associated hog odor, were the highest).

*Steve Wing et al., *Air Pollution from Industrial Swine Operations and Blood Pressure of Neighboring Residents*, 121 *Envtl. Health Perspectives* 92 (2013), attached as **Exhibit 51**.

*M.E. Anderson & M.D. Sobsey, *Detection and Occurrence of Antimicrobially Resistant E. coli in Groundwater on or near Swine Farms in Eastern North Carolina*, 54 Water Sci. & Tech. 211, 217 (2006), attached as **Exhibit 37** (“Overall, the results of this study demonstrated that antibiotic-resistant E. coli were present in groundwaters associated with commercial swine farms that have anaerobic lagoons and land application systems for swine waste management.”).

*Wendee Nicole, *CAFOs and Environmental Justice: The Case of North Carolina*, 121 Env'tl. Health Perspectives A182, A186 (2013), attached as **Exhibit 44** (“Even without spills, ammonia and nitrates may seep into groundwater, especially in the coastal plain where the water table is near the surface.”).

*Steve Wing et al., *Environmental Injustice in North Carolina's Hog Industry*, 108 Env'tl. Health Perspectives 225, 228 (2000), attached as **Exhibit 52**. (finding that North Carolina's intensive hog confinement operations are located disproportionately in communities with higher levels of poverty, higher proportions of non-white persons, and higher dependence on wells for household water supply).

*JoAnn M. Burkholder et al., *Impacts of Waste from CAFOs on Water Quality*, 115 Env'tl. Health Perspectives 308, 309 (2007), available at <http://dx.doi.org/10.1289/ehp.8839>, attached as **Exhibit 3 to Burkholder Declaration**.

Dana Cole et al., *Concentrated Swine Feeding Operations and Public Health: A Review of Occupational and Community Health Effects*, 108 Env'tl. Health Perspectives 685 (2000), available at <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1638284/pdf/envhper00309-0041.pdf>, attached as **Exhibit 39**.

Carrie Hribar, Nat'l Ass'n of Local Bds. of Health, *Understanding Concentrated Animal Feeding Operations and Their Impact on Communities*, *Environmental Health* 4 (2010), available at http://www.cdc.gov/nceh/ehs/docs/understanding_cafos_nalboh.pdf, attached as **Exhibit 40**.

Pew Commission on Industrial Farm Animal Production, *Environmental Impact of Industrial Farm Animal Production 1-2* (2008), available at http://www.ncifap.org/_images/212-4_EnvImpact_tc_Final.pdf, attached as **Exhibit 45**.

Pew Commission on Industrial Farm Animal Production, *Putting Meat on the Table: Industrial Farm Animal Production in America* (2008), available at http://www.ncifap.org/_images/PCIFAPSmry.pdf, attached as **Exhibit 46** (describing the rise of industrial animal production in America and the effects on public health and the environment).

Cited in Complaint, but copy not provided.

Joan A. Casey, *High-Density Livestock Operations, Crop Field Application of Manure, and Risk of Community-Associated Methicillin-Resistant Staphylococcus aureus Infection in Pennsylvania*, 173 J. Am. Med Ass'n: Internal Med. 1980 (2013).

Ctrs. for Disease Control, U.S. Dep't of Health and Human Servs., Antibiotic Resistance Threats in the United States, 2013, at 6 (2013), *available at* <http://www.cdc.gov/drugresistance/threat-report-2013/pdf/ar-threats-2013-508.pdf>.

Oliver Denis et al., *Methicillin-Resistant Staphylococcus aureus ST398 in Swine Farm Personnel, Belgium*, 15 Emerging Infectious Diseases 1098 (2009) (Belgium).

*B. Edwards B & AE Ladd, *Race, Poverty, Political Capacity and the Spatial Distribution of Swine Waste in North Carolina, 1982–1997*, 9 North Carolina Geogr 55–77 (2001).

Michael Greger & Gowri Koneswaran, *The Public Health Impacts of Concentrated Animal Feeding Operations on Local Communities*, 33 Farm Cmty. Health 11, 13 (2010).

Joseph Herriges et al., *Living with Hogs in Iowa: The Impact of Livestock Facilities on Rural Residential Property Values*, 81 Land Econ. 530 (2005).

Carol J. Hodne, Iowa Policy Project, Concentrating on Clean Water: The Challenge of Concentrated Animal Feeding Operations 8 (2005), *available at* <http://www.iowapolicyproject.org/2005docs/050406-cafo-fullx.pdf>. 2005docs/050406-cafo-fullx.pdf (identifying “seepage from earthen manure storage structures” as typical pathway for nitrates entering groundwater).

Xander W. Huijsdens et al., *Community-Acquired MRSA and Pig-Farming*, 5 Annals Clinical Microbiol. & Antimicrobials 26 (2006) (Netherlands).

T. Khanna et al., *Methicillin Resistant Staphylococcus aureus Colonization in Pigs and Pig Farmers*, 128 J. Veterinary Microbiol. 298 (2008) (Canada).

*Jungik Kim & Peter Goldsmith, *A Spatial Hedonic Approach to Assess the Impact of Swine Production on Residential Property Values*, 42 Env'tl & Res. Econ. 509 (2009) (estimating decline in Craven County home property values on per hog basis).

*Michael A. Mallin et al., Ctr. for Marine Science Research, Univ. of N.C. at Wilmington, Effect of Organic and Inorganic Nutrient Loading on Photosynthetic and Heterotrophic Plankton Communities in Blackwater Rivers (1998), *available at* <http://repository.lib.ncsu.edu/dr/bitstream/1840.4/1880/1/NC-WRRI-315.pdf>;

*Katherine Milla et al., *Evaluating the Effect of Proximity to Hog Farms on Residential Property Values: A GIS-Based Hedonic Model Approach*, 17 URISA J. 27 (2005) (finding that values of

Craven County, North Carolina homes decreased with increasing local hog populations and decreasing distances from homes to factory farms).

* Rinsky JL, Nadimpalli M, Wing S, Hall D, Baron D, Price LB, et al. 2013. *Livestock-Associated Methicillin and Multidrug Resistant Staphylococcus Aureus Is Present Among Industrial, Not Antibiotic-Free Livestock Operation Workers in North Carolina*. PLoS One 8:e67641.

Jochen Schulz et al., *Longitudinal Study of the Contamination of Air and of Soil Surfaces in the Vicinity of Pig Barns by Livestock-Associated Methicillin-Resistant Staphylococcus aureus*, 78 Applied Env'tl. Microbiol. 5666 (2012) (detecting MRSA 300 feet from a barn in which animals, air, and workers' plastic boots tested positive for MRSA).

Doug Gurian-Sherman, Union of Concerned Scientists, CAFOs Uncovered: The Untold Costs of Confined Animal Feeding Operations (2008), available at http://www.ucsusa.org/assets/documents/food_and_agriculture/cafos-uncovered.pdf (discussing the substantial cost of confined animal feeding operations and discussing alternatives).

EK Silbergeld & LB Price LB, *Industrial Food Animal Production, Antimicrobial Resistance, and Human Health*, 29 Ann. Rev. of Pub. Health 151 (2008).

Tara C. Smith et al., *Methicillin-Resistant Staphylococcus aureus (MRSA) Strain ST398 Is Present in Midwestern U.S. Swine and Swine Workers*, 4 PLoS One e4258 (2009).

Tara C. Smith et al., *Methicillin-Resistant Staphylococcus aureus in Pigs and Farm Workers on Conventional and Antibiotic-Free Swine Farms in the USA*, 8 PLoS One e63704 (2013).

Stacy Sneeringer, *Does Animal Feeding Operation Pollution Hurt Public Health? A National Longitudinal Study of Health Externalities Identified by Geographic Shifts in Livestock Production*, 91 Am. J. Agric. Econ. 124, 130 (2009).

*Paul B. Stretesky et al., *Environmental Inequity: An Analysis of Large-Scale Hog Operations in 17 States, 1982-1997*, 68 Rural Soc. 231 (2003) (finding that between 1982 and 1997 large-scale hog operations in North Carolina were more likely to be sited in areas with a disproportionate number of black residents).

K.M. Thu, *Public Health Concerns for Neighbors of Large-Scale Swine Production Operations*, 8 J. Agric. Safety & Health 175 (2002) (synthesizing research regarding public health concerns for neighbors of industrial swine facilities, including respiratory issues associated with air pollution).

Ingrid V.F. Van den Broek et al., *Methicillin-Resistant Staphylococcus aureus in People Living and Working in Pig Farms*, 137 J. Epidem. & Infection 700 (2009) (Netherlands).

Wing S. 2002. *Social Responsibility and Research Ethics in Community-Driven Studies of Industrialized Hog Production*. *Environ. Health Perspect.* 110:437–444.

Bridgett M. West et al., *Antibiotic Resistance, Gene Transfer, and Water Quality Patterns Observed in Waterways Near CAFO Farms and Wastewater Treatment Facilities*, 217 *Water Air Soil Pollution* 473 (2011).

Julia R. Barrett, *Airborne Bacteria in CAFOs: Transfer of Resistance from Animals to Humans*, 113 *Envtl. Health Perspectives* A116 (2005) (reviewing literature on cross-species transfer of antibiotic-resistant bacteria).

Amy Chapin et al., *Airborne Multidrug-Resistant Bacteria Isolated from a Concentrated Swine Feeding Operation*, 113 *Envtl. Health Perspectives* 137 (2005) (finding multidrug-resistant *Enterococcus*, coagulase-negative staphylococci, and viridans group streptococci in the air of an industrial swine operation at levels dangerous to human health).

Jennifer K. Costanza et al., *Potential Geographic Distribution of Atmospheric Nitrogen Deposition from Intensive Livestock Production in North Carolina, USA*, 398 *Sci. Total Env't* 76, 77 (2008).

Shawn G. Gibbs et al., *Isolation of Antibiotic-Resistant Bacteria from the Air Plume Downwind of a Swine Confined or Concentrated Animal Feeding Operation*, 114 *Envtl. Health Perspectives* 1032 (2006).

Shawn G. Gibbs et al., *Airborne Antibiotic Resistant and Nonresistant Bacteria and Fungi Recovered from Two Swine Herd Confined Animal Feeding Operations*, 1 *J. Occupational & Env'tl. Hygiene* 699 (2004) (finding multidrug-resistant bacteria inside and downwind of industrial swine operations at levels previously determined to pose a human health hazard). (midwest CAFOs)

*Rachel Avery Horton et al., *Malodor as a Trigger of Stress and Negative Mood in Neighbors of Industrial Hog Operations*, 99 *Am. J. Pub. Health Suppl.*, S610 (2009). (Hog odor, hydrogen sulfide, and semivolatile PM₁₀ are related to stress and negative mood in disproportionately low-income communities near industrial hog operations in eastern North Carolina. Malodor should be considered in studies of health impacts of environmental injustice.)

*Wing S, Horton RA, Marshall SW, Thu K, Tajik M, Schinasi L, et al. 2008. *Air Pollution and Odor in Communities Near Industrial Swine Operations*. *Environ. Health Perspect.* 116:1362-1368. (For approximately 2 weeks, 101 nonsmoking adult volunteers living near industrial swine operations in 16 neighborhoods in eastern North Carolina sat outdoors for 10 min twice daily at preselected times.)

James A. Merchant et al., *Asthma and Farm Exposures in a Cohort of Rural Iowa Children*, 113 *Envtl. Health Perspectives* 350 (2005) (finding children living on swine farms, including large facilities with more than 500 head, experienced increased rates of asthma compared to non-exposed children; results more pronounced where swine facilities added antibiotics to feed).

Katja Radon et al., *Environmental Exposure to Confined Animal Feeding Operations and Respiratory Health of Neighboring Residents*, 18 Epidemiology 300 (2007) (surveying nearly 7,000 residents of four German towns with high confined livestock operation densities and concluding that such operations “may contribute to the burden of respiratory disease among their neighbors”). (Footnoted in Earthjustice comments on draft permit).

C.A. Rotz, *Management to Reduce Nitrogen Losses in Animal Production*, 82 J. Animal Sci. E119, E129 (2004).

Ana M. Rule et al., *Assessment of an Aerosol Treatment To Improve Air Quality in a Swine Concentrated Animal Feeding Operation*, 39 Env'tl. Sci. & Tech., 9649, 9649 (2005).

Matias B. Vanotti & Patrick G. Hunt, Ammonia Removal from Swine Wastewater Using Immobilized Nitrifiers, in *Proceedings of the 8th Int'l. Conf. of the FAO ESCORENA Network on Recycling of Agricultural, Municipal and Industrial Residues in Agriculture*, Rennes, France 427, 428 (1998), available at <http://www.ramiran.net/doc98/FIN-ORAL/VANOTTI.pdf>.

James A. Zahn et al., *Air Pollution from Swine Production Facilities Differing in Waste Management Practice* 3, *Proceedings of the Odors and Emission 2000 Conference* (2000) (listing all types of “emissions released from stored swine manure” mentioned above).

*John T. Walker et al., *Atmospheric Transport and Wet Deposition of Ammonium in North Carolina*, 34 Atmospheric Env't 3,407 (2000).

*Susan S. Schiffman et al., *Quantification of Odors and Odorants from Swine Operations in North Carolina*, 108 Agric. & Forest Meteorology 213 (2001).

*Susan S. Schiffman et al., *Symptomatic Effects of Exposure to Diluted Air Sampled from a Swine Confinement Atmosphere on Healthy Human Subjects*, 113 Env'tl. Health Perspectives 567 (2005) (finding that those exposed to diluted swine air for two 1-hour sessions were more likely to report headaches, eye irritation, and nausea than the control group that was exposed to clean air); <http://www.ncbi.nlm.nih.gov/pubmed/15866765>. (Aerial emissions from a swine house at North Carolina State University's field laboratory were diluted to a level that could occur at varying distances downwind from a confined animal feeding operation (CAFO) both within and beyond the property line, and these emissions were delivered to an environmental exposure chamber.)

*Sacoby M. Wilson & Marc L. Serre, *Use of Passive Samplers to Measure Atmospheric Ammonia Levels in a High-density Industrial Hog Farm Area of Eastern North Carolina*, 41 Atmospheric Env't 6,074 (2007).

*JoAnn M. Burkholder & Howard B. Glasgow, *History of Toxic Pfiesteria in North Carolina Estuaries from 1991 to the Present*, 51 Biosci. 827, 833 (2001) (“During acute [Pfiesteria]

exposure, fish commonly hemorrhage or develop skin lesions that are diffuse or nonfocal, as well as deep, localized or focal, bleeding sores or ulcerations.”).

*Michael A. Mallin et al., *Factors Contributing to Hypoxia in Rivers, Lakes, and Streams*, 51 *Limnology & Oceanography* 690, 699-700 (2006). (Investigated physical, chemical, and biological variables contributing to biochemical oxygen demand (BOD) in 17 North Carolina lotic and lentic water bodies affected by mild to severe hypoxia.)

*Steve Wing, et al., *The Potential Impact of Flooding on Confined Animal Feeding Operations in Eastern North Carolina*, 110 *Envtl. Health Perspectives* 387, 387 (2002), available at <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1240801/pdf/ehp0110-000387.pdf> (describing how the 15-20 inches of rain dropped by Hurricane Floyd turned eastern North Carolina into a fecal flood zone). The flooding following Hurricane Floyd was not an isolated incident. *Id.* (“In 1996, 22 fecal waste pits were reported to have been ruptured or inundated following flooding from Hurricane Fran, and one major spill was reported following Hurricane Bonnie in 1998.”).

Studies not listed above cited in Exhibit 4 (Steve Wing & Jill Johnston, Dep’t of Epidemiology, Univ. of N.C. at Chapel Hill, *Industrial Hog Operations in North Carolina Disproportionately Impact People of Color* (2014)).

Donham K. 1993. *Respiratory Disease Hazards to Workers in Livestock and Poultry Confinement Structures*. *Seminars in Respiratory Medicine* 14:49-59.

Donham K, Reynolds S, Whitten P, Merchant J, Burmeister L, Popendorf W. 1995. *Respiratory Dysfunction in Swine Production Facility Workers: Dose-response Relationships of Environmental Exposures and Pulmonary Function*. *American Journal of Industrial Medicine* 27:405-418.

Donham K, Cumro D, Reynolds S, Merchant J. 2000. *Dose-Response Relationships Between Occupational Aerosol Exposures and Cross-Shift Declines of Lung Function in Poultry Workers: Recommendations for Exposure Limits*. *Journal of Occupational and Environmental Medicine* 42:260-269.

Green CF, Gibbs SG, Tarwater PM, Mota LC, Scarpino PV. 2006. *Bacterial Plume Emanating from the Air Surrounding Swine Confinement Operations*. *Journal of Occupational and Environmental Hygiene* 3:9-15. (midwest CAFOs)

Schiffman SS, Sattely Miller EA, Suggs MS, Graham BG. 1995. *The Effect of Environmental Odors Emanating from Commercial Swine Operations on the Mood of Nearby Residents*. *Brain Research Bulletin* 17:369-375. (possibly NC, haven’t gotten access to study yet)

*Tajik M, Muhammad N, Lowman A, Thu K, Wing S, Grant G. 2008. *Impact of Odor from Industrial Hog Operations on Daily Living Activities*. *New Solutions* 18:193-205.

*Bullers S. 2005. *Environmental Stressors, Perceived Control, and Health: The Case of Residents Near Large-Scale Hog Farms in Eastern North Carolina*. Human Ecology 33:1-16.

Casey JA, Curriero FC, Cosgrove SE, Nachman KE, Schwartz BS. 2013. *High-Density Livestock Operations, Crop Field Application of Manure, and Risk of Community-Associated Methicillin-Resistant Staphylococcus Aureus Infection in Pennsylvania*. JAMA Internal Medicine 173:1980-1990.

*Cole D, Drum DJ, Stalknecht DE, White DG, Lee MD, Ayers S, et al. 2005. *Free-living Canada Geese and Antimicrobial Resistance*. Emerging Infectious Diseases 11:935-938. (Describes antimicrobial resistance among *Escherichia coli* isolated from free-living Canada Geese in Georgia and North Carolina (USA). Resistance patterns are compared to those reported by the National Antimicrobial Resistance Monitoring System. Canada Geese may be vectors of antimicrobial resistance and resistance genes in agricultural environments.)

Donham KJ. 1990. *Health Effects from Work in Swine Confinement Buildings*. American Journal of Industrial Medicine 17:17-25.

Donham KJ, Wing S, Osterberg D, Flora JL, Hodne C, Thu KM, et al. 2007. *Community Health and Socioeconomic Issues Surrounding Concentrated Animal Feeding Operations*. Environ. Health Perspect. 115:317-320.

*Furuseth O. 1997. *Restructuring of Hog Farming in North Carolina: Explosion and Implosion*. Professional Geographer 49:391-403.

Graham JP, Price LB, Evans SL, Graczyk TK, Silbergeld EK. 2009. *Antibiotic Resistant Enterococci and Staphylococci Isolated from Flies Collected near Confined Poultry Feeding Operations*. Sci Total Environ 407:2701-10. (Delmarva Peninsula)

*Rinsky JL, Nadimpalli M, Wing S, Hall D, Baron D, Price LB, et al. 2013. *Livestock-Associated Methicillin and Multidrug Resistant Staphylococcus Aureus Is Present Among Industrial, Not Antibiotic-Free Livestock Operation Workers in North Carolina*. PloS One 8:e67641.

Thu K, Donham K, Ziegenhorn R, Reynolds S, Thorne P, Subramanian P, et al. 1997. *A Control Study of the Physical and Mental Health of Residents Living near a Large-Scale Swine Operation*. Journal of Agricultural Safety and Health 3:13-26.

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van de Giessen AW, van Santen-Verheuve MG, Hengeveld PD, Bosch T, Broens EM, Reusken CB. 2009. *Occurrence of Methicillin-Resistant Staphylococcus Aureus in Rats Living on Pig Farms*. Preventive Veterinary Medicine 91:270-273. (Netherlands)

Studies not listed above but Earthjustice cited in their 2013 comments on draft Swine Permit

*Rachel Avery et al., *Odor from Industrial Hog Farming Operations and Mucosal Immune Function in Neighbors*, 59(2) Archives of Env'tl. Health 101 (2004) (finding that swine odor was associated with reduced mucosal immune function among 15 adults living near industrial swine operations in North Carolina).

J.M. Ham & K.A. Baum, *Measuring Seepage from Waste Lagoons and Earthen Basins with an Overnight Water Balance Test*, 52 Am. Soc'y of Agric. And Biological Engineers 835 (2009) (introducing test capable of producing accurate seepage measurements in single overnight performance).

J.M. Ham, *Seepage losses from animal waste lagoons: A summary of a four year investigation in Kansas*, 45 Am. Soc'y of Agric. Eng'rs 983 (2002) (summarizing study performed using earlier variation of water balance method).

Other studies OCR has located:

Donham KJ1, Lee JA, Thu K, Reynolds SJ., *Assessment of air quality at neighbor residences in the vicinity of swine production facilities.*, *J Agromedicine*. 2006;11(3-4):15-24. doi: 10.1300/J096v11n03_03. <http://www.ncbi.nlm.nih.gov/pubmed/19274894>

Abstract: Air sampling was completed on the front lawn of 35 homes neighboring swine farms in three different regions in the Upper Midwest of the United States. One region was dominated by large scale, swine confined animal feeding operations (CAFO's) noted as swine confinement area (SCA). The second area was dominated by smaller scale operations utilizing hoop structure facilities (HA). The third area was basically devoid of livestock, dominated by row-crop production, and served as the control area (CA). The time weighted average concentrations of hydrogen sulfide (8.42 ppb) was higher ($p = 0.047$) in SCA area than the control (3.48 ppb). However, carbon dioxide (449.6 ppm), ammonia (12.78 ppb) and PM10 (42.25 microg/m³) were higher in the hoop structure area than the other areas. Swine population density, distance between the homes and swine facilities, and wind direction had an interactive effect on the average levels of ammonia ($p = 0.04$). The contaminant levels at the homes were relatively low compared to typical concentrations inside animal buildings. However, exceedences of federal recommended limits for hydrogen sulfide in outdoor air were observed in the swine CAFO area. Concentration of hydrogen sulfide exceeded the recommended limits of the ATSDR (30 ppb) for chronic exposure at two of the 12 homes in the CAFO area (17%). Average hydrogen sulfide concentration exceeded the EPA recommended community standards (0.7 ppb) in all three areas

assessed (SCA, HA, and CA). As chronic exposure to hydrogen sulfide may be present in areas of production agriculture, a potential health risk may be present. Further studies to provide additional information regarding exposures to hydrogen sulfide in rural environments are warranted.

Thorne PS, Ansley AC, Perry SS. *Concentrations of bioaerosols, odors, and hydrogen sulfide inside and downwind from two types of swine livestock operations*. J Occup Environ Hyg. 2009 Apr;6(4):211-20. doi: 10.1080/15459620902729184
<http://www.ncbi.nlm.nih.gov/pubmed/19177273>

Abstract: Few data on in-barn and downwind concentrations of endotoxin, bioaerosols, and odors from livestock facilities are available, and no studies have compared conventional confinement operations with the more animal-friendly hoop operations. Hoops are open to the environment and use a composted bedding system rather than housing pigs on slatted floors over pits holding manure slurry as in conventional confinements. We assessed airborne toxicants upwind, in barns, and downwind and evaluated determinants of exposure. Inhalable particulate matter, endotoxin, odor threshold, hydrogen sulfide, culturable mesophilic bacteria, culturable fungi, and total airborne microbes, along with wind speed, temperature, and humidity were measured at separate mid-sized livestock facilities (one hoop, one confinement) in Central Iowa on 10 occasions over 2 years. Significant differences in contaminants were observed between hoops and confinement buildings and across seasons for endotoxin, odors, airborne microorganisms, and hydrogen sulfide. For hoops and confinements, respectively, geometric mean in-barn concentrations were 3250 and 3100 EU/m³ for endotoxin; 1400 and 1910 microg/m³ for particulates; 19.6 and 146 ppb for hydrogen sulfide; 137 and 428 dilutions for odor threshold; and 3.0 x 10⁶ and 1.5 x 10⁶ organisms/m³ for total microbes. Endotoxin, odor, and culturable microorganisms exceeded recommended exposure limits. Reduced analysis of variance models for these contaminants demonstrated differences by barn type, season, number of pigs, and, in some cases, temperature and humidity. Both types of swine operations produced high airborne concentrations of endotoxin, odor, hydrogen sulfide, bacteria, and fungi. Endotoxin and odors were found downwind at concentrations previously associated with adverse health effects.

*Christopher D. Heaney, Kevin Myers, Steve Wing, Devon Hall, Dothula Baron, Jill R. Stewart, *Source Tracking Swine Fecal Waste in Surface Water Proximal To Swine Concentrated Animal Feeding Operations*, Science of the Total Environment 511 (2015) 676-683.

Abstract: For one year, surface water samples at up- and downstream sites proximal to swine CAFO lagoon waste land application sites were tested for fecal indicator bacteria (fecal coliforms, *Escherichia coli* and *Enterococcus*) and candidate swine-specific microbial source-tracking (MST) markers (*Bacteroidales* Pig-1-Bac, Pig-2-Bac, and Pig-Bac-2, and methanogen P23-2). Testing of 187 samples showed high fecal indicator bacteria concentrations at both up- and downstream sites. Overall, 40%, 23%, and 61% of samples exceeded state and federal recreational water quality guidelines for fecal coliforms, *E. coli*, and *Enterococcus*, respectively. Pig-1-Bac and Pig-2-Bac showed the highest specificity to swine fecal wastes and were 2.47

(95% confidence interval [CI] = 1.03, 5.94) and 2.30 times (95% CI = 0.90, 5.88) as prevalent proximal down- than proximal upstream of swine CAFOs, respectively. Pig-1-Bac and Pig-2-Bac were also 2.87 (95% CI = 1.21, 6.80) and 3.36 (95% CI = 1.34, 8.41) times as prevalent when 48 hour antecedent rainfall was greater than versus less than the mean, respectively. Results suggest diffuse and overall poor sanitary quality of surface waters where swine CAFO density is high. Pig-1-Bac and Pig-2-Bac are useful for tracking off-site conveyance of swine fecal wastes into surface waters proximal to and downstream of swine CAFOs and during rain events.

*Michael A. Mallin & Matthew R. McIver & Anna R. Robuck & Amanda Kahn Dickens, *Industrial Swine and Poultry Production Causes Chronic Nutrient and Fecal Microbial Stream Pollution*, *Water Air Soil Pollut* (2015) 226: 407

Abstract: Chemical and biological stream water quality of a swine and poultry CAFO-rich watershed was investigated on 10 dates during 2013. Geometric mean fecal coliform counts were in the thousands at five of seven sites, especially in locations near swine waste sprayfields. Nitrate concentrations were very high and widespread throughout the watershed, with some individual samples yielding >10 mg-N/L. Ammonium concentrations were likewise high, but greatest near swine waste sprayfields, ranging up to 38 mg-N/L. Five-day biochemical oxygen demand (BOD5) concentrations exceeded 10 mg/L in 11 of 70 stream samples, reaching as high as 88 mg/L. BOD5 concentrations were significantly correlated with components of animal waste including total organic carbon, ammonium, and phosphorus, as well as the nutrient response variable chlorophyll a. The degree of nutrient and fecal contamination did not significantly differ between rainy and dry periods, indicating that surface and groundwater pollution occurs independently of stormwater runoff. This research shows that industrial-scale swine and poultry production leads to chronic pollution that is both a human health and ecosystem hazard. There are approximately 450,000 CAFOs currently operating in the USA, with the majority located in watersheds feeding major riverine and estuarine systems with known water quality problems. Current US waste management protocols for this widespread system of livestock production fail to protect freshwater and estuarine ecosystems along the US Mid-Atlantic, Southeast and Gulf coasts, and expansion into industrializing nations will likely bring severe pollution with it.

*Michael A. Mallin, Mary Grace Lemon, Matthew R. McIver, ENVIRONMENTAL QUALITY OF WILMINGTON AND NEW HANOVER COUNTY WATERSHEDS, 2013, CMS Report 14-01, Center for Marine Science University of North Carolina Wilmington, Wilmington, N.C. 28409 (May 2014) <http://www.uncw.edu/cms/aclab/>

*Michael A. Mallin, Matthew R. McIver, Amanda Kahn Dickens and Anna R. Robuck, Center for Marine Sciences, *University of North Carolina Wilmington Chronic Stream Pollution in a CAFO Rich Watershed in Duplin County, NC* (2013) (in NC Studies folder)

*Harden, Stephen L., USGS Prepared in cooperation with the North Carolina Department of Environment and Natural Resources, Division of Water Resources, *Surface-Water Quality in Agricultural Watersheds of the North Carolina Coastal Plain Associated with Concentrated Animal Feeding Operations*, Scientific Investigations Report 2015–5080 (2015).

Abstract: The effects of concentrated animal feeding operations (CAFOs) on water quality were investigated at 54 agricultural stream sites throughout the North Carolina Coastal Plain during 2012 and 2013. Three general watershed land-use types were examined during the study, including 18 background watersheds with no active CAFOs (BK sites), 18 watersheds with one or more active swine CAFOs but no poultry CAFOs (SW sites), and 18 watersheds with at least one active swine CAFO and one active dry-litter poultry CAFO (SP sites). The watershed drainage areas for these 54 stream sites ranged from 1.2 to 17.5 square miles. Conventional fertilizers used for crop production are the primary source of nutrients at the BK sites. Animal-waste manures represent an additional source of nutrients at the SW and SP study sites. . . . When compared on the basis of land-use type, there was an overall measurable effect of CAFO waste manures on stream water quality for the SW and SP watershed groups. . . . On the basis of the results of this study, land applications of waste manure at swine CAFOs influenced ion and nutrient chemistry in many of the North Carolina Coastal Plain streams that were studied.

*Arun D. Shendrikar, Joette Steger, Hoke Kimball, Wayne Cornelius, Mark Yirka, Robert Bishop and Neil Joyner, *Ambient Atmospheric Ammonia Monitoring Around Hog Farm Industries in North Carolina* (date unknown – likely 2005 or 2006) (conducted by NC DEQ staff. Copy located in NC specific folder. In 1999, the Ambient Monitoring Section of Division of Air Quality (AMS-DAQ) started ammonia monitoring in the light of exponential growth of the regional hog farm industries. “There remains a merit to continue monitoring ammonia for the following reasons:

–It is a well documented fact (through open literature) that agricultural practices have affects on increased ammonia emissions into the environment.”)

*Deanna L. Osmond, Dana L. K. Hoag, Al E. Luloff, Donald W. Meals and Kathy Neas, *Farmers’ Use of Nutrient Management: Lessons from Watershed Case Studies*, *Journal of Environmental Quality* – Article, Vol. 44 No. 2, p. 382-390 (March 2015).

Abstract: Nutrient enrichment of water resources has degraded coastal waters throughout the world, including in the United States (e.g., Chesapeake Bay, Gulf of Mexico, and Neuse Estuary). Agricultural nonpoint sources have significant impacts on water resources. As a result, nutrient management planning is the primary tool recommended to reduce nutrient losses from agricultural fields. Its effectiveness requires nutrient management plans be used by farmers. There is little literature describing nutrient management decision-making. Here, two case studies are described that address this gap: (i) a synthesis of the National Institute of Food and Agriculture, the Conservation Effects Assessment Project, and (ii) field surveys from three nutrient-impaired river basins/watersheds in North Carolina (Neuse, Tar-Pamlico, and Jordan Lake drainage areas). Results indicate farmers generally did not fully apply nutrient management plans or follow basic soil test recommendations even when they had them. Farmers were found to be hesitant to apply N at university-recommended rates because they did not trust the recommendations, viewed abundant N as insurance, or used recommendations made by fertilizer dealers. Exceptions were noted when watershed education, technical support, and funding resources focused on nutrient management that included easing management demands, actively and consistently working directly with a small group of farmers, and providing significant resource allocations to fund agency personnel and cost-share funds to farmers. Without better dialogue with farmers and meaningful investment in strategies that reward farmers for taking

what they perceive as risks relative to nutrient reduction, little progress in true adoption of nutrient management will be made.

Travis Lee Kleinschmidt, *Modeling hydrogen sulfide emissions: are current swine animal feeding operation regulations effective at protecting against hydrogen sulfide exposure in Iowa?* Dissertation, Univ. of Iowa, 2011. (Models a large swine CAFO using the air quality dispersion model AERMOD and graphs the estimated concentration of hydrogen sulfide of vs. distance from the CAFO. Reading his graph the concentration of hydrogen sulfide at 3 miles is about half that at 2 miles.)

*Yelena Ogneva-Himmelberger *, Liyao Huang and Hao Xin, *CALPUFF and CAFOs: Air Pollution Modeling and Environmental Justice Analysis in the North Carolina Hog Industry*, ISPRS Int. J. Geo-Inf. 2015, 4, 150-171; doi:10.3390/ijgi4010150 (Published: 26 January 2015)

Abstract: Concentrated animal feeding operations (CAFOs) produce large amounts of animal waste, which potentially pollutes air, soil and water and affects human health if not appropriately managed. This study uses meteorological and CAFO data and applies an air pollution dispersion model (CALPUFF) to estimate ammonia concentrations at locations downwind of hog CAFOs and to evaluate the disproportionate exposure of children, elderly, whites and minorities to the pollutant. Ammonia is one of the gases emitted by swine CAFOs and could affect human health. Local indicator of spatial autocorrelation (LISA) analysis uses census block demographic data to identify hot spots where both ammonia concentrations and the number of exposed vulnerable population are high. We limit our analysis to one watershed in North Carolina and compare environmental justice issues between 2000 and 2010. Our results show that the average ammonia concentrations in hot spots for 2000 and 2010 were 2.5–3-times higher than the average concentration in the entire watershed. The number of people living in the areas where ammonia concentrations exceeded the minimal risk level was 3647 people in 2000 and 3360 people in 2010. We recommend using air pollution dispersion models in future environmental justice studies to assess the impacts of the CAFOs and to address concerns regarding the health and quality of life of vulnerable populations.



Location: User-specified point center at 34.540152, -78.463441
 Ring (buffer): 1-mile radius
 Description: Bladen Springs Farm

Summary	Census 2010
Population	101
Population Density (per sq. mile)	14
Minority Population	62
% Minority	61%
Households	49
Housing Units	54
Land Area (sq. miles)	7.02
% Land Area	99%
Water Area (sq. miles)	0.07
% Water Area	1%

Population by Race	Number	Percent
Total	101	-----
Population Reporting One Race	101	100%
White	41	40%
Black	58	57%
American Indian	0	0%
Asian	0	0%
Pacific Islander	0	0%
Some Other Race	2	2%
Population Reporting Two or More Races	0	0%
Total Hispanic Population	3	3%
Total Non-Hispanic Population	98	97%
White Alone	39	39%
Black Alone	58	57%
American Indian Alone	0	0%
Non-Hispanic Asian Alone	0	0%
Pacific Islander Alone	0	0%
Other Race Alone	0	0%
Two or More Races Alone	0	0%

Population by Sex	Number	Percent
Male	48	48%
Female	53	52%

Population by Age	Number	Percent
Age 0-4	4	4%
Age 0-17	20	20%
Age 18+	81	80%
Age 65+	16	16%

Households by Tenure	Number	Percent
Total	49	
Owner Occupied	40	82%
Renter Occupied	9	18%

Data Note: Detail may not sum to totals due to rounding. Hispanic population can be of any race.

Source: U.S. Census Bureau, Census 2010 Summary File 1.



Location: User-specified point center at 35.322333, -78.943123

Ring (buffer): 1-mile radius

Description:

Summary of ACS Estimates		2010 - 2014		
Population				128
Population Density (per sq. mile)				51
Minority Population				38
% Minority				30%
Households				43
Housing Units				55
Housing Units Built Before 1950				4
Per Capita Income				26,224
Land Area (sq. miles) (Source: SF1)				2.53
% Land Area				100%
Water Area (sq. miles) (Source: SF1)				0.00
% Water Area				0%
		2010 - 2014 ACS Estimates	Percent	MOE (±)
Population by Race				
Total		128	100%	386
Population Reporting One Race		123	96%	729
White		94	73%	377
Black		20	16%	162
American Indian		2	2%	31
Asian		1	0%	18
Pacific Islander		0	0%	12
Some Other Race		6	5%	129
Population Reporting Two or More Races		6	4%	84
Total Hispanic Population		7	6%	82
Total Non-Hispanic Population		121		
White Alone		90	70%	364
Black Alone		20	16%	162
American Indian Alone		1	1%	20
Non-Hispanic Asian Alone		1	0%	18
Pacific Islander Alone		0	0%	12
Other Race Alone		5	4%	128
Two or More Races Alone		3	3%	64
Population by Sex				
Male		71	55%	254
Female		57	45%	192
Population by Age				
Age 0-4		16	12%	124
Age 0-17		42	32%	179
Age 18+		87	68%	225
Age 65+		4	3%	36

Data Note: Detail may not sum to totals due to rounding. Hispanic population can be of any race. N/A means not available.

Source: U.S. Census Bureau, American Community Survey (ACS) 2010 - 2014.



Location: User-specified point center at 35.322333, -78.943123

Ring (buffer): 1-mile radius

Description:

	2010 - 2014 ACS Estimates	Percent	MOE (±)
Population 25+ by Educational Attainment			
Total	79	100%	234
Less than 9th Grade	0	0%	12
9th - 12th Grade, No Diploma	5	7%	58
High School Graduate	16	21%	102
Some College, No Degree	28	36%	117
Associate Degree	6	7%	57
Bachelor's Degree or more	29	36%	148
Population Age 5+ Years by Ability to Speak English			
Total	113	100%	333
Speak only English	110	97%	288
Non-English at Home ¹⁺²⁺³⁺⁴	3	3%	42
¹ Speak English "very well"	3	3%	42
² Speak English "well"	0	0%	12
³ Speak English "not well"	0	0%	12
⁴ Speak English "not at all"	0	0%	12
³⁺⁴ Speak English "less than well"	0	0%	12
²⁺³⁺⁴ Speak English "less than very well"	0	0%	12
Linguistically Isolated Households*			
Total	0	0%	12
Speak Spanish	0	0%	12
Speak Other Indo-European Languages	0	0%	12
Speak Asian-Pacific Island Languages	0	0%	12
Speak Other Languages	0	0%	12
Households by Household Income			
Household Income Base	43	100%	110
< \$15,000	1	2%	22
\$15,000 - \$25,000	4	8%	44
\$25,000 - \$50,000	5	12%	52
\$50,000 - \$75,000	13	30%	91
\$75,000 +	20	47%	116
Occupied Housing Units by Tenure			
Total	43	100%	110
Owner Occupied	31	73%	81
Renter Occupied	11	27%	105
Employed Population Age 16+ Years			
Total	93	100%	269
In Labor Force	62	67%	205
Civilian Unemployed in Labor Force	4	4%	45
Not In Labor Force	31	33%	159

Data Note: Detail may not sum to totals due to rounding. Hispanic population can be of any race. N/A means not available. Source: U.S. Census Bureau, American Community Survey (ACS) 2010 - 2014.

*Households in which no one 14 and over speaks English "very well" or speaks English only.



Location: User-specified point center at 35.322333, -78.943123

Ring (buffer): 1-mile radius

Description:

	2010 - 2014 ACS Estimates	Percent	MOE (±)
Population by Language Spoken at Home*			
Total (persons age 5 and above)	113	100%	333
English	N/A	N/A	N/A
Spanish	N/A	N/A	N/A
French	N/A	N/A	N/A
French Creole	N/A	N/A	N/A
Italian	N/A	N/A	N/A
Portuguese	N/A	N/A	N/A
German	N/A	N/A	N/A
Yiddish	N/A	N/A	N/A
Other West Germanic	N/A	N/A	N/A
Scandinavian	N/A	N/A	N/A
Greek	N/A	N/A	N/A
Russian	N/A	N/A	N/A
Polish	N/A	N/A	N/A
Serbo-Croatian	N/A	N/A	N/A
Other Slavic	N/A	N/A	N/A
Armenian	N/A	N/A	N/A
Persian	N/A	N/A	N/A
Gujarathi	N/A	N/A	N/A
Hindi	N/A	N/A	N/A
Urdu	N/A	N/A	N/A
Other Indic	N/A	N/A	N/A
Other Indo-European	N/A	N/A	N/A
Chinese	N/A	N/A	N/A
Japanese	N/A	N/A	N/A
Korean	N/A	N/A	N/A
Mon-Khmer, Cambodian	N/A	N/A	N/A
Hmong	N/A	N/A	N/A
Thai	N/A	N/A	N/A
Laotian	N/A	N/A	N/A
Vietnamese	N/A	N/A	N/A
Other Asian	N/A	N/A	N/A
Tagalog	N/A	N/A	N/A
Other Pacific Island	N/A	N/A	N/A
Navajo	N/A	N/A	N/A
Other Native American	N/A	N/A	N/A
Hungarian	N/A	N/A	N/A
Arabic	N/A	N/A	N/A
Hebrew	N/A	N/A	N/A
African	N/A	N/A	N/A
Other and non-specified	N/A	N/A	N/A
Total Non-English	N/A	N/A	N/A

Data Note: Detail may not sum to totals due to rounding. Hispanic population can be of any race. N/A means not available. **Source:** U.S. Census Bureau, American Community Survey (ACS) 2010 - 2014.

*Population by Language Spoken at Home is available at the census tract summary level and up.

EPA

Moderator: Jonathan Stein
June 7, 2016
1:54 p.m. ET

Operator: This is Conference # 163166159.

(Ericka): Hello.

(Marianne): Hi, it's (Marianne) (inaudible) and (Alexis Andiman) from (Earth Justice).

(Ericka): Hello (Marianne) and (Alexis). This is (Ericka Farrell) from Title VI (OCR).

(Marianne): Hi there.

(JerylJeryl): This is (JerylJeryl Covington) with OCR.

(Johanna): Hi, this is (Johanna Johnston) from (OGC). I believe we're just going to wait a couple more of more minutes. We're waiting for somebody else to join us on our side. Is Dr. Wing on the phone?

(unknown): Not yet.

(Ericka): OK.

(Elizabeth): Hi, it's (Elizabeth Haddock) at the Center for Civil Rights.

(Ericka): Hi (Elizabeth), this is (Ericka Farrell) from the Title VI OCR office and then we also have (JerylJeryl Covington) and (Johanna Johnston).

(Elizabeth): Great, great. Hope everybody is well.

(Ericka): Yes.

(Marianne): Hello (Liz) it's (Marianne) and (Alexis).

(Elizabeth): Hey there.

(Marianne): We just received a quick note.

(UnknownEricka):Hello.

Steve Wing: Hello, this is Steve. Sorry for being a few minutes late.

(Elizabeth): Hey Steve, it's (Elizabeth) and (Marianne) and (Alexis) are on too.

Steve Wing: Oh, so we're waiting for?

(Elizabeth): I think EPA's on as well EPA.

(Ericka): They're on yes. Hi Steve.

Steve Wing: Hello.

(ErickaEricka): So we have folks who will introduce themselves in the office of civil rights and the office of general counsel. I think they were also waiting for one more staff member from the office of general counsel.

(Johanna): OK. I think EPA's (also) here now too.

(Ericka): OK, great.

(Johanna): Do you want to?

(Ericka): OK. So is Dr. Wing?

(Johanna): Yes, he joined us.

(Ericka): OK, good afternoon everyone. Again this is (Ericka Farrell) from the office of civil rights with the U.S. Environmental Protection Agency in Washington D.C. and thank you for taking the time to talk with us. And as you know the office of civil rights is investigating whether North Carolina Department of

Environmental Quality I'm sorry, regulation of swine feeding operations discriminate against African Americans, Latinos and native Americans on the basis of race and national origin and neighboring counties and violate Title VI in EPA's implementing regulations.

And just so that you know, this interview will be recorded. And for the record Dr. Wing, can you please provide your full name?

Steve Wing: My full name, Steven with a V, Bennett Wing.

(Mary): And can we – this is (Mary O'Lone) from EPA office of general counsel. Can we just go around and say all who's on the phone before we sort of launch in here? So this is (Mary O'Lone) from the office of general counsel at EPA and we'll go around the room here.

(Johanna): Hi, this is (Johanna Johnston). I'm also from general counsel at EPA.

(JerylJeryl): This is (JerylJerylCovington) with the office of civil rights at EPA.

(Ericka): And again this is (Ericka Farrell) from the office of civil rights Title VI office.

(Mary): (Marianne), you want to do your group?

(Marianne): Sure so I'll start. It's (Marianne Engelman Lado) and I'm with Earth Justice.
(Alexis)?

(Alexis): (Alexis Andiman) also with Earth Justice.

(Marianne): And (Elizabeth).

(Elizabeth): (Elizabeth Haddock) at the UNC Center for Civil Rights.

(Brad): (Brad Dusham) also at the Center for Civil Rights.

(Ericka): OK, that's it.

(Mary): And then Dr. Wing. OK yes.

(Ericka): OK. Now again Dr. Wing could you provide us your professional contact information specifically your office address, office telephone number and office email.

Steve Wing: Yes. My address is department of epidemiology campus box 7435 University of North Carolina Chapel Hill, North Carolina 27312. Phone, 919-966-7416. Email, (steve_wing@unc.edu).

(Ericka): Thank you. And we're going to start with a line of questioning.

(Mary): So this is (Mary O'Lone) and I wanted to say you know thank you Dr. Wing for making yourself available for the interview and that you know if at any time you need to take a break or we need to break just let us know and we'll do that. And then also if we need to end early and you know reschedule or whatever we'll make whatever accommodations we need to.

Steve Wing: Thank you.

(Mary): But we very much appreciate you making yourself available. So we're going to start off with some quick sort of one off questions and then get into more of a general conversation as we go on. The first question was just was – is have you ever conducted any research that was funded by the pork industry?

Steve Wing: No I have not.

(Mary): Have you ever conducted any research on behalf of the North Carolina legislature such as the environmental review commission or any part of the North Carolina legislature?

Steve Wing: No I have not.

(Mary): OK. And this is just a general question about your research. So we see you know we see that you've focused on the swine industry and I'm just sort of wondering if you could give us a little background as to why not all cases in North Carolina but you know why you focus on swine.

Steve Wing: Well I was introduced to the problem in 1995 when I began to meet residents of eastern North Carolina who were impacted in their neighborhoods by swine

operations. So I followed and I researched. I learned early on that there were – there was quite a bit of research about the swine confinements the new liquid waste management systems. But it was almost entirely about the engineering of the waste pits and the spray fields, animal nutrition, veterinary practices and so on and there was not any literature on environmental health impacts.

And because the residents that I met believed they were being most affected by the swine industry and keep in mind this is 20 years ago, I decided to focus on that. The poultry industry had not expanded as much at that time as it has now. Also because of the engineering waste management practices the liquid waste systems I believe had more potential for impacting neighbors than the dry (litter) system that most of the turkey and chicken operations use.

They are not benign but at the time I began it appeared to me that the swine operations were more important and furthermore they had developed very rapidly. The number permitted had increased very rapidly. And one of the other – one of the other issues that was brought up repeatedly by the residents that I met was that these facilities were disproportionately placed in communities of color. So it was that combination of issues that led me to focus on the swine operations.

(Mary): I have a question about you know the increase in the number of swine over time and I have to be – I have yet to figure out the answer to it and I'm hoping maybe you can help me. So in your declaration you say that between I think it was the early 80s and 2007 the number of swine increased from 2 million to 10 million. And then we also see that there was a moratorium on the expansion of swine facilities and you know permitting of new facilities between '95 and 2007. And I've been trying to figure out if there's you know when I read the sort of plain language of what is a moratorium and no expansion and no new ones how the numbers of pigs jumped.

Steve Wing: The expansion was primarily during the period of between the early 80s and 1998. Thereafter the numbers fluctuate. There were some facilities that had applied for permits before the moratorium that weren't able to open but for the most part the growth was between around 1980 and the late 1990s.

(Mary): OK, all right. Now we have some specific questions regarding the disparity studies and then after that we're going to just sort of focus on your interaction with North Carolina DEQ and the swine regulatory – the swine waste regulatory process. But we had a specific request about the October 19th, 2015 update. And you know we read that you had basically cleaned the coordinates you know to make sure that you had the right ones before you did the analysis. And we were wondering if we could get – if we could get those coordinates and any information you have describing the changes that were made to the North Carolina coordinates and the reasons for those changes.

Steve Wing: Definitely. I'm you know I haven't done the programming myself but I can contact either (Jill Johnston) or one of the research assistants at UNC and we can provide that to you.

(Mary): OK that'd be great. We have spoken to – we spoke to Dr. (Johnston) I'm sure (Marianne) told you and she was able to answer some of our questions about the 2014/2015 study but we still had a couple that we would like to ask you. And you know part of this is just – a lot of it is us we're not epidemiologists, trying to get a firm grasp on how we articulate to policy makers within EPA and those that we have to talk with. You know being able to explain in very plain terms what your study says and you know what it means.

And one of the – one of the questions that we have is just about getting a grip on the methodology that's used to count people in the two studies, in the one you did in 2000 and in the 2014/2015 study. And we were trying to figure out different ways to you know have you help us. And I think what we came up with we thought might be the easiest would be for the 2014/2015 study would be to look at table four and just you know march us through the numbers. Do you have it in front of you by any chance?

Steve Wing: I'm looking at table four right now from the updated study.

(Mary): From the – right. So it's at the top of page 14, right. Make sure we're talking about ...

Steve Wing: That's right.

- (Mary): OK.
- (Elizabeth): Can you hold on just a second? I'm just pulling it up as well.
- (Mary): Sure, sure.
- (Elizabeth): So this is from the 2015 study?
- (Mary): Yes, the 2015 study.
- (Elizabeth): OK.
- (Mary): And I was hoping this would help us you know just sort of generally march through how it's done because I have read and reread it the study and just tried to figure it out and it's me. (I'm not sure). I just have a, I have a tough time processing this kind of information. So in the first column the percent people of color, what you're – that is the, that represents of – tell me what that – tell me what that represents there, that column?
- Steve Wing: OK. So the first column percent POC are the ranges of percent for census blocks. So there are if you look at the first and second columns, there are 559,000 179,000 people who live in census blocks with no people of color.
- (Mary): And the census blocks are – the census blocks that you're counting are those that have a centroid within three miles of a CAFO, right?
- Steve Wing: No this is in this case this is all the census blocks in the study area.
- (Mary): All the census blocks in the study area, OK.
- Steve Wing: So the sum of the column population yields the total number of people in the study area. Because everyone in the study area lives in a block that either has no people of color or has less than 20 percent, 20 to 40 et cetera up to 80 to 100 percent people of color.
- (Mary): OK. And to get into the study area you had to be a census block that had a CAFO in it?

- Steve Wing: No, that's not the case. The study area was defined as the whole state minus ...
- (Mary): OK, right.
- Steve Wing: The five major cities and the western counties which have no permanent CAFOs either in those counties or an adjacent county.
- (Mary): OK and these are all ...
- Steve Wing: And that's we made following the work we had done previously that had been peer reviewed.
- (Mary): Repeat that. I think I interrupted – I was going to interrupt you but so.
- Steve Wing: The decision about how to define the study area mirrored the decision we made in our 2000 publication.
- (Mary): Right, OK. OK, so this is – these are the populations in the study area, OK. So then the ratio's comparing the percent of people residing within three miles of an (IHO) in blocks with people of color compared to blocks without people of color?
- Steve Wing: No, that means that there's a – what we have is the population of each of the categories the percent people of color that lives within three miles in a census block within three miles of an (IHO) divided by the total population give the percent of people in that group that live within three miles of an (IHO). The ratio column is the ratio of each of the categories above zero to the proportion in the zero category.
- (Mary): Right.
- Steve Wing: And it's a way of comparing to look for whether there's a trend across the categories of people of color.
- (Mary): OK. Ok And then the 95 percent CI, can you explain that?

Steve Wing: That's CI stands for confidence interval. There's for each of the ratios there's a statistic called the standard error and the 95 percent confidence interval is a standard way of expressing that. It's the standard error times 1.96 subtracted from and added to the prevalence ratio. And it gives an idea of the amount of data that each of these ratios is based on. So, narrow confidence intervals and these are narrow shows that, if a few people were moved one way or the other it wouldn't make any difference to the prevalence ratio. It's a very stable statistic.

If for example looking at the 0.75 in the second row, the confidence interval is 0.74 to 0.75. So you could move people back between categories and it wouldn't result in much change. But if the confidence interval were say 0.30 to 2.8 then by moving a few people you would get quite a different prevalence ratio. And we provide these confidence intervals because they're very standard. I didn't spend much time writing about them.

(Mary): Yes, that's all right.

Steve Wing: And but if this report were to be read by an epidemiologist or a statistician or an economist or someone else who uses these kinds of statistics they would expect the confidence intervals to be provided.

(Mary): OK, thank you. OK now we were going to look at the 2000 study. Do you have that with you by any chance?

Steve Wing: I'm sure I haven't kind of – no, I have to open it up. Just a moment.

(Mary): OK. Well you know maybe we don't need to have you look at it in particular but ...

Steve Wing: Yes, I remember it pretty well.

(Mary): OK. Was there the difference between the way you counted you developed who was impacted how you counted the people seems to be slightly different. So maybe if you could just ...

Steve Wing: It is slightly different and I can explain that.

(Mary): OK.

Steve Wing: So in the 2000 study we wanted to analyze both race and poverty. Poverty is not (inaudible) it's available for census blocks. Census blocks are the smallest enumeration unit used by the U.S. Census Bureau. Race is available at the census block level but not poverty. Block groups are larger geographic areas.

And that study was based on whether there was an (IHO) in the block group because those areas are large enough to be able to contain potentially numerous (IHOs). In the current study we were not looking at poverty and that's because of the way Title VI is written. We just were looking at race and ethnicity. So we could use the census blocks which are much smaller and they would be more specific to counting people and their proximity to the (IHOs). So they are less heterogeneous because they're smaller.

Furthermore, we had the benefit of 15 years or so of research where we were getting an idea of more quantitative idea of how far away people could be impacted by the air pollutants from these facilities and we chose three miles. At some point any particular radius is arbitrary. Three miles had been used in some of our prior work and based both on our measurements and our interviews with people we felt that it was clear that people can be – can experience negative impacts of the air pollutants at that distance.

So in the latter study the 2015 report, we considered people potentially exposed if they lived in a block that was within three miles of an (IHO) as opposed to the first study where people were potentially counted as potentially exposed if they lived in a block group, a collection of blocks that had an (IHO). And the difference is because of number one, our focus on race and ethnicity and number two, our increased understanding of the distance over which these facilities can affect people. Does that answer your question?

(Mary): That answers it perfectly, thank you. And it answers another question that we had about you know over time it seemed like the – you had, there were different distances in different studies but the more recent ones we're seeing seem to be focusing on this three mile distance and so ...

Steve Wing: And I would call your attention to the most recent study that was provided in your materials published just earlier this year in which we measured hydrogen sulfide at public middle schools. And in that study the quantitative relationship between the hydrogen sulfide levels at the schools and the area of the swine farms that are up wind is about three miles, five kilometers.

(Mary): Right, right yes I read that. And I have a quick question about that study. As I read it, what I understood it to say is that the monitor was placed downwind meaning the wind blows from the (case load) to the monitor at the school and that the measurements of the (hydrogen sulfide) tended to be higher when the wind was not blowing, when the air was just kind of hanging around.

Steve Wing: OK, let me elaborate ...

(Mary): But there was no (measurable), OK.

Steve Wing: Just to clarify that.

(Mary): OK.

Steve Wing: The monitors were at the schools continuously for several weeks. So during the time the monitors were at the schools the wind blew from different directions and sometimes it was wind speed was below what's detectable so the air was pretty still. So the monitors were in place during all those conditions whatever direction the wind was coming from or however fast it was blowing. And what we found was that the hydrogen sulfide levels were very strongly correlated with the number of – with the area of the swine farms up wind at the hour that the measurement was made.

So basically we took all the hours that were during which the monitor was operating at the school, we divided the weeks up into hours and for each hour we assigned a wind direction and a wind speed. And for those hours when the wind was coming from a direction where there were IHOs and more IHOs and more nearby IHOs the hydrogen sulfide levels were higher.

(Mary): OK.

Steve Wing: And when the winds were coming from other directions the hydrogen sulfide levels were either undetectable or lower.

(Mary): Thank you, that was very helpful. OK, so that was a digression. We're going to go back to the – we're going to go back to the 2000 study and the 2015 study. Were there any critiques or criticisms of the 2000 study when it came out?

Steve Wing: Well I received some verbal criticism and concern. I'm not aware of you know any publications or letters to the editor or to the journal or anything like that that challenged any of our findings or our methods.

(Mary): And what – and by verbal criticism what do you mean?

Steve Wing: Well, (in) maybe it was early 2000 I presented a version of this paper at the annual meeting at the Society of Toxicology I was invited to present the results there. And after I presented the results there was some press coverage and I was called to the North Carolina branch of representatives agriculture committee to testify about this study. And some of the legislators were they seemed to be concerned about our findings.

I wouldn't say that the criticisms were about – they were not like scientific criticisms about how we analyzed the data or about the quality of the study. It was about our findings that there was this disproportionate impact. Actually I don't know if you have a copy of it but I wrote an article about that experience, that includes a description of that of my appearance before the house agriculture committee. I think it was published in 2002 and it also describes the Pork Council's use of the Public Records Act request to try and obtain confidential information about the study participants in one of our subsequent studies.

And if you're at all interested in the potential that researchers might be might face some kind of intimidation tactics when they research this topic I could send you that paper.

(Mary): Yes would you please.

(Jeryl): Dr. Wing, this is (Jeryl Covington). I do have one question about your presentation at the legislature. Do you have a copy of or do you know if that was a recorded meeting or open to the public where minutes might be available from your presentation?

Steve Wing: You know I've never seen any and I don't know, I really don't know whether there was a recording or minutes were taken.

(Jeryl): OK. Do you know if you were in a recordable room in the Archdale building?

Steve Wing: I was in the Archdale building in a committee meeting room but I don't know what their technology was.

(Jeryl): OK.

(Mary): OK, thank you. So ...

(Marianne): Let me – this is (Marianne). Let me just say we'll work with Steve to collect all this stuff and then we'll send it on to you.

(Mary): That's great. Thank you.

Steve Wing: And I would also mention you know just (in turn) that there were some pork industry lobbyists at that meeting who approached me after the public session to express their discontent.

(Mary): You mean after the – after you gave your testimony?

Steve Wing: Yes, that's right. And so these criticisms are not written or public to my knowledge but you ask if there were criticisms and that's what you know in particular what stands out for me.

(Mary): And is that were those – do you have that recorded in the article you wrote?

Steve Wing: Yes, I have some information in that yes.

(Mary): OK great, thank you. Well the next question was like a follow up to that as to whether anything you heard about the 2000 study led to a change in the methodology for 2015.

Steve Wing: No.

(Mary): OK.

Steve Wing: As I said, the criticisms that I heard were not about how the study was conducted or the data quality or the analytical methods. It was only about the findings and our interpretation.

(Mary): OK. And maybe just can you just tell us what the basis was, what the criticism was about the findings?

Steve Wing: Basically it was the criticism was well what do you expect? This is where the industry goes and it's poor and communities of color.

(Mary): What? No he's saying that ...

Steve Wing: So basically the point that this shouldn't be surprising and it's not really news or anything.

(Mary): Right, OK. OK, so the 2014/2015 study did – was that sent to it was well. I guess the 2014 study was sent to North Carolina because it was attached in DEQ, NCDEQ because it was attached to the Title VI complaint, right (Marianne)? They got it because it was one of your exhibits and you sent everything to them when you filed the complaint?

(Marianne): I think that's correct but we will double check that.

(Mary): OK. Did you bring that 2014 study and or the update the 2015 study, other than as a part of the Title VI complaint for the 2014 one to North Carolina DEQ's attention?

Steve Wing: No, no I didn't work directly with them.

(Mary): OK. (Marianne) did you by any chance when you sent it to us the update did it go to them?

(Marianne): I don't believe it did but I can check that.

(Mary): OK. So have you ...

Steve Wing: So just to clarify for me, DEQ is aware of the civil rights complaint. Is that true?

(Mary): Yes.

Steve Wing: They have a copy of the complaint, is that true?

(Mary): Yes.

(Marianne): So I'm going to double check this but my recollection you know we before filing the complaint we submitted comments on behalf of a number of groups. You hadn't done the analysis yet but raising the concern that there was a disparate impact based on all the research that had been done up till that point and asking DEQ to do a disproportionality analysis and a disparate impact analysis. Then when we filed the complaint we – my recollection and I can I'll again double check, my recollection is we gave them a courtesy call and we sent them a copy as well.

Part of the reason I want to double check is I recall that there was one confidentiality issue and I recall our needing to let both EPA and DEQ know that that one particular map needed to be redacted and that we would send subsequent information. So my recollection is that we sent DEQ the whole package the first time around. Now when we've sent EPA subsequent filings I don't believe that we have sent DEQ additional information. And of course we went through mediation and in the mediation it was clear that they had received the complaint and it's not clear that they had read it but they had received it and you know, by that time it was more than a year had passed. So they definitely have the complaint and the study, the first study but I will check to confirm all that.

- (Mary): OK, thank you. So since – and maybe this is addressed to both (Marianne) and Dr. Wing. Since – have you heard anything from DEQ about the 2014 one? Because if they got one that would be the one they got, right.
- Steve Wing: I haven't heard anything from DEQ directly. In fact but that's not unprecedented. They've never contacted me about any of our research.
- (Mary): OK, well that's going to short circuit a lot of our questions coming down the line here. So we'll get (inaudible).
- Steve Wing: They've had you know they've had some of them research. I feel quite confident including at the North Carolina environmental justice summit. But they have not approached me with any questions or requests for further information.
- (Mary): OK. So for the 2014 study I guess I'm debating whether to ask this but I'm just going to go ahead and ask it. So ...
- (Marianne): And (Mary), I'm sorry can I interrupt you? When you say 2014 study can we just be clear about which one we're talking about because we I think we've – you're not talking about the updated and that disparity analysis that came out in October.
- (Mary): Right, I'm talking about the – well, we can say the 2014/2015 study. But I'm my assumption is that it wasn't made – the 2015 update had not been sent to DEQ. The only thing they would have gotten thus far is the 2014. So the question is just you know has there been any feedback from North Carolina DEQ on the '14 or the update? And the answer seems to be no.
- Steve Wing: From my knowledge correct (and there's been) no response.
- (Mary): Have you had – has there been any response or anything from the pork industry?
- Steve Wing: Not to my knowledge.
- (Mary): OK.

Steve Wing: And this is a topic which is a little bit sensitive. I realize this is not your question directly but I should mention, I believe you have a copy of the letter that I and some of my colleagues sent to (Christine Lawson) at DEQ before the new general permit was approved.

(Mary): Yes.

Steve Wing: You know I have to, I should let you know that I was told by an official at the National Institute of Environmental Health Sciences that I had violated their policy for (external) researchers by sending that letter. So my contacts with DEQ are of concern to the funding agency that supported most of the research described in that letter because their – they have told me that although there was a request for public comments on the general permit which is what I was responding to, that I was only supposed to inform public officials about our research if I was asked as an individual. And so this is another kind of difficult issue regarding working under federal grants is the National Institute of Health apparently has some concern about informing government officials about research conducted with support from NIH.

And so this is – and the reason I bring it up is because it's to some extent, well to a large extent a disincentive for me to engage in any conversation with government officials including DEQ ...

(Mary): I see.

Steve Wing: Unless they initiate it.

(JerylJeryl): Dr. Wing let me ask you when they, when you receive that information was that one of the stipulations of grant you accepted? That's what they were outlining for you?

Steve Wing: It's not in the grant but it's a policy that was adopted I believe in 2014 but possibly 2013.

(JerylJeryl): OK. But your presentation, your public comments would have preceded that policy initiation or just in the same timeframe of the general permit being

issued? Which came first, the policy or the public hearing request by (DENA) at the time when the general permits were being renewed?

Steve Wing: OK, so I'm looking at the date of my letter to (Christine Lawson). It's December 2013 so I'm off by a year. I just slipped there. So the policy came out I believe in 2013 or possibly 2012.

(JerylJeryl): OK because I'm looking at – I'm looking at one of the postings for the public meeting on the general permit it's dated October 28th, 2013.

Steve Wing: Right, I did not appear at that meeting.

(JerylJeryl): OK.

Steve Wing: The admonition that I received from NIEHS was about the letter that I wrote.

(Marianne): So that is referring to – I'm sorry. Is it exhibit two of the complaint filed in September of 2014.

(JerylJeryl): Right, his comments on the general permit.

(Marianne): Correct.

(JerylJeryl): Yes.

(Marianne): And can I just (while) I've interrupted already, the CC list that you asked about on the complaint filed September 3rd, 2014 with your initial study and all of the exhibits included (Christine Lawson) division of water resources at (DENA) and (Tom Reeder) division of water resources at (DENA). So (DENA) received, now DEQ received the original complaint with all of the attachments including the 2000 and – what we're calling the 2014 disparities analysis. We did not have that CC list on the subsequent letter we sent on April you know or other correspondence that we have.

We're assuming that the office of civil rights is collecting information from DEQ that we're not receiving and we are sending information to the office of civil rights that we similarly are not giving to DEQ. So we didn't, it's my recollection that we did not send that – any subsequent information after the

complaint. We got no response to the complaint and then we did not send any additional information nor did they ask for it after sending the complaint.

(Mary): OK. All right, thank you. Actually I just want to ask a question about NIEH. Maybe we can talk. So prior to that policy it would have been fine for you to send comments in on a general permit?

Steve Wing: That's my understanding.

(Mary): OK. For the 2014/2015 study are there any areas that you – any adjustments you'd make to it or that you, you know would explore if you had more time, money you know whatever however you might want to adjust it?

(Marianne): Before answering just so I'm clear, (Mary) when you call it the 2014/2015 study I'm not clear what that is. Can we call the first study 2014 and then the updated study so we just distinguish between them?

(Mary): Sure. The 2014 study that was updated in 2015.

Steve Wing: Right. I would you know if I had had time and support I would potentially shorten the report for submission to a peer review publication but I wouldn't change the analysis.

(Mary): OK. Are there any plans to have it submitted for a peer review or publication?

Steve Wing: It's something I want to do but I've been occupied by other concerns and so I haven't done it yet.

(Mary): OK. Well our next question was about the distances and we went through that. We did the 95 moratorium. OK so now we're going to – now we'd like to talk about the renewal, the general permit and the renewal processes. And so we have your comments for the 2014 process. Did you participate in any of the previous renewals providing comments and your studies whatever the studies you had to that point you know to DEQ?

Steve Wing: No, I did not.

(Mary): So this was the first one? OK. All right so now we're going to – we're going to run through the North Carolina specific study and we're kind of going to ask the same questions about each study. And starting with the your 2000 study about occupational and community health effects. So the – well basically the questions we're going to ask are you know was that, did you or are you aware of that study being brought to the attention of North Carolina DEQ or any other state agency?

So for example the first one is about occupational health you know was it sent to any other state agency that might have jurisdiction over the issue and then to any local agencies? And if so was there a response to it? Were any actions taken after they heard about it? And then depending on the study just we're just asking if the methodologies that were used like in their study were they the kind – is it the methodology that would be used by North Carolina DEQ's air quality division? Or if it's a water analysis were the protocols there the kind that DEQ would use?

So we're just going to sort of march through each study and ask these questions.

Steve Wing: OK so ...

(Mary): Do you want to take a – do you want to take a break or anything?

Steve Wing: I think we can keep going at this point.

(Mary): OK.

(Marianne): Can I just mention before Dr. Wing answers from his point of view that I don't know the full range of ways in which DEQ might have seen these studies, heard about these studies you know government meetings, professional organizations. We know something about and Steve you can talk about the you know you've already mentioned the summit and their appearance at the summit. But I do at least want to point out that in December of 2013 you have it as exhibit three attached to the complaint, Earth Justice, Water Keeper and Southern Environmental Law Center submitted comments on the permit

renewal that's the subject of the complaint which cites to many of these studies just looking at it quickly.

For example expert note 18 cites to Wing and Wolf among others. Footnote 21 cites to Wing and all potential impact. So I don't know how Dr. Wing would possibly have known all the ways in which that information might get to DEQ but you have in your possession at least one example of ways in which that was formally presented to DEQ before they made the decision on the permit.

(Mary): Yes, yes. And that's sort of what – we're only asking him what he knows about not, you know the ways that he knows it that it may have been brought to their attention. So the idea being these studies you know we're going back to 2000 there have been – general permit has been renewed a couple of times, right in this intervening time period. And so what I'm trying to see other than the fact that he has just said that he didn't participate formally in the hearing process, submit written comments into previous renewals, is he aware himself because maybe he didn't or he participated in you know some meeting with the DEQ or whatever where they were made specifically aware of the studies. OK?

(Marianne): Yes, I mean go ahead. Yes, I want to make sure you use his expertise and time efficiently but feel free. Keep going.

(Mary): So and I understand they were all brought – they were all brought to the attention of the DEQ in your comments in 2013. What I'm trying to get at is prior to that have there been prior instances where any of these studies were formally brought to their attention. That's what I'm trying to get at. And you know we can march through all of them or just if there's a general answer of that he can give that's fine too.

Steve Wing: Well I can say that the Wing and Wolf study from 2000 that (Marianne) just mentioned, that study was the results were first released by the North Carolina department of health and human services before the paper was published in the peer review journal. And I can't believe that they would have been

unaware of that because there was press coverage and so on. But I didn't send it to them directly and I don't know if DHHS did.

Other than that I can only give the general answer that they have had personnel at our environmental justice summit where some of this research had been presented and discussed in addition to they having the opportunity to hear from neighbors of these facilities who described their personal experiences and difficulties and impacts of the air pollutants on their quality of life, ability to use their property, their health and so on.

(JerylJeryl): Dr. Wing this is one question. You said at the environmental justice meetings that have happened the network meetings you said (DENA) or DEQ representatives were there. Are you meaning the secretary or members of the water quality section? Who are you referring were at the EJ network meetings?

Steve Wing: I don't have a list of who was there but I'm sure the secretary never came, I'm sure (Christine Lawson) came. I don't know what years. I don't have a record of that. And I believe other DEQ who are department of environment and natural resources staff came and there's when (Christine) did not come.

(Mary): So the environmental justice summit, I mean (Marianne) do you have information on these meetings when they occurred and who they were with or?

(Marianne): Yes, we can get you more information about that.

(Mary): All right, yes. So the – so maybe we can follow up on that later and sort of figure that out. But it sounds like what you're saying is that over the years there have been a series of these meetings, DEQ's been invited and DEQ officials have shown up and that and you've made presentations there about your research.

Steve Wing: I have and so have other colleagues who participated in these studies.

(Mary): OK.

- (JerylJeryl): And this is (JerylJeryl) again. I have one question. You mentioned that the department of health and human services released your Wing Wolf 2000 study. What were their comments to that? What reactions or follow up did you get from the department of health and human services?
- Steve Wing: they actually provided financial support for that work. So their announcement of the findings took the form of a press release basically describing the results of a study that they supported.
- (Mary): And then what happened? Then ...
- Steve Wing: Then what happened was on the same day that the press release came out the North Carolina Pork Council file a Public Record Act request. It was to me and my colleague Susanne Wolf copied to the UNC general counsel as well as to the DHHS division that funded the study demanding under the North Carolina public records statute all records associated with this study including the identities of the participants who I should note we had to protect their confidentiality in order to do this study under federal regulation.
- (Mary): OK. So this was partially funded by the federal government or it came a grant through the state?
- Steve Wing: Partly funded by NIEHS and partly funded by the North Carolina DHHS.
- (Mary): OK, OK. And so did the department of health do anything after just releasing the study? Was there any sort of change in the world?
- Steve Wing: You know I'm not sure. You know unfortunately what you're pointing out or the line of questioning is pointing out is how isolated many of us academic researchers are from the policy arena. And this is part of academic culture and it's reinforced by government agencies that are concerned that we would actually influence policy, the NIH policy to (inaudible) and we're not supposed to contact public officials.
- So I've spent most of my time and effort getting the research into the open literature. I've spent some time with reporters. It's been covered not only by you know in the academic journals but to some degree by periodic journalist

reports. But I'm not working in a culture that has close connections with the regulators and you know I think that's a problem and I will admit to you that it is. But partly we can't all do everything. And given the pressures to keep our funding and teach and advise students and so on which I have to do to keep my job, it leaves limited time to engage in dialogue and routine conversation with regulators.

(Mary): OK.

Steve Wing: I mean just to explain my situation.

(JerylJeryl): Yes Dr. Wing let me ask one question here. You mentioned funding. After you did the publication with the department of health and human services the press release was submitted and you got the request for information by the Pork Council, did that impact your funding that was issued - Was – did you view that as being retaliatory in nature the request ...

Steve Wing: At the same time I know there was a pork industry request that came through a U.S. senator for NIEHS to investigate our grant. I was told that by our grants officer at NIEHS. We maintained our funding at that time so they did not determine that we had done anything wrong presumably. But at – I mean it took a lot of time and grief to deal with that but I don't believe at that time it influenced our funding from the federal government.

(JerylJeryl): What about at the state level because I'm assuming that there was a pass through of the federal funds to the state level department of health and human services?

Steve Wing: No, actually the funds we got from DHHS North Carolina DHHS were not federal funds, they were state funds. And we did not receive any more state funds for this kind of work ever again.

(JerylJeryl): OK. Let me ask you this and I hate to go back but on the press release from DHHS do you feel like they were supportive of your work, dismissive of your work? What you know I want to I guess get clarity what did ...

Steve Wing: Right. I believe they were supportive of our work.

- (JerylJeryl): What did they do with – what did they do to further it? You said that you received no other state grant but what did they do to further the study that you and Wolf prepared?
- Steve Wing: I'm not aware that they – I'm not aware of what they did beyond make public the findings. I mean I've always presumed that the North Carolina department of environment is not in a vacuum. It's insulated from all information on the outside produced by government and academic scientists. Now, maybe I'm naïve about this but I've assumed that there was at least through press coverage or some other means that there was some way that they would know about something that happens outside of their department.
- (JerylJeryl): Now even with that press coverage can you go back and clarify for me, I apologize. I just want to make sure I understand. Were you contacted by any other agencies or any other industries besides the Pork Council after the press release by DHHS?
- Steve Wing: No.
- (JerylJeryl): OK.
- Steve Wing: I mean I was contacted by people associated with the pork industry in writing, also by phone.
- (Mary): And can you just talk a little bit about that?
- Steve Wing: Well the part in writing was the Public Records Act request. I also received at least one phone call, maybe more than one from someone who wanted to talk with me about getting the identities of the study participants. And then gosh that reminds me, I also had some kind of bizarre voicemail that was accusing me of gosh I don't remember, may have called me a communist or something like that but I didn't pay really pay any attention to it.
- (JerylJeryl): Let me ask one question. Who – since you lost this particular state funding, who's funding you at a state level for your continuation in this particular area if you don't mind?

Steve Wing: We have received no further state funds since 1999. I should say that the state health director at that time in 1999 was interested in the problem of these industrial swine operations and their impact on neighbors but he did not continue in his position beyond 2000. So I think it was partly through his interest that we were funded.

(JerylJeryl): How many applications or submissions of study details have you presented back to DHHS or any other state agency for potential funding?

Steve Wing: We have not. They to my knowledge they do not have (external) grant programs set up to fund researchers like me. The one that we had, the funding we had for the 1999 study which was published in environmental perspective in 2000, that study you know Wing and Wolf study was funded because we were collaborating with epidemiologists at DHHS. So it wasn't as though – we didn't apply for it independently.

We were actually collaborating with them because people in DHHS believed that there were problems that needed to be documented. And so they were present at the design phase of that study and participated in deliberations.

(Marianne): I'm this is (Marianne). I just want to be cognizant of the time and aware that we sent to you the office of civil rights a tremendous number of significant peer review papers on you know on the impact of hog operations on children, on health effects, on a variety of outcomes. I'm sure you all are watching the clock too but want to make sure you have time to ask Dr. Wing if you have any methodological or other questions or questions about his declaration as well.

(Mary): Thank you. We don't actually have any questions I guess (Marianne). We've read the studies, we don't have any questions on them right now. And you know to the extent we do we'll follow up and you know either you know work with Dr. Wing if he's available or you know the co-authors if that's possible you know like we were doing before.

So really the last question we had because this was the – this was the information we were most interested in right now was you know Dr. Wing's particular perspective from working in the area for a long time and getting an

understanding of how North Carolina has been you know apprised of this from perspective only and then what responses there may or may have not have been to them. And so you know sort of a wrap up question that we had was if you'd had any other if you had any Dr. Wing had any other – had interactions with North Carolina DEQ outside of the EJ summit which it sounds like there was some and submitting the comments in December 2013.

You know any interactions that you've had with North Carolina DEQ or any other part of the North Carolina government either the department of agriculture, labor you know HHS over the issue of regulating swine (cases)?

Steve Wing: I'm sure I can say very little. I should before I say definitively I could check my list of presentations that's on my CV. I'm trying to remember. I think they were mostly there was an EPA presentation but maybe not to – not to North Carolina's DEQ.

(Mary): OK.

Steve Wing: Now here it is. Now let's see, no hold on that's not it. Sorry, I wasn't prepared for this question.

(Marianne): In your legal research and testimony section, page 30 of your CV says the state of North Carolina, Wade County office administrative hearings there was a case that was involving North Carolina there. That has been a ...

Steve Wing: Right. That was not about swine operations.

(Marianne): OK.

Steve Wing: But there is a section of my CV that begins on page 16 and which includes many public presentations about these – about this topic as well as other topics I've worked on the course.

(Mary): OK.

Steve Wing: It includes academic meetings in universities met.. At North Carolina State University where I'm pretty sure the one in 2010.

(Mary): The November 11th, 2010?

Steve Wing: Yes, that one I'm almost positive there would have been DEQ people there but I can't give you any names.

(Mary): OK, that's all right. That helps.

Steve Wing: And (if I) quickly scan through there I might be able to call your attention to another one.

(Mary): Do DEQ people ever come to your school and participate in any of the presentations that you have in UNC?

Steve Wing: Not to my knowledge.

(Mary): Or your presentations at Research Triangle Park?

Steve Wing: Not to my knowledge.

(Mary): OK. In your experience have you ever seen any evidence that suggested that the swine farm industry – well that North Carolina has better non-minority communities from the impacts from swine farms? Is there – is there ...

Steve Wing: Well I can give you my opinion on that.

(Mary): OK.

Steve Wing: And it's I believe it's informed by experience although it's not something I could give you an equation and make a calculation of my conclusion here. But I strongly believe that these facilities would not have been permitted to operate as they do if they were primary locate – primarily located in predominantly white areas in the in other parts of the state. The facilities have extremely obvious impacts. If you go there if you I mean and you could now – let me make clear.

You could go there for a day and maybe there wouldn't be much air pollution on that day in the place you went because it's not constant all the time. And the other thing I can say is not every one is affected the same way. Some

people are more sensitive than others. And what's presented in our research are the average effects among people in the study not that everyone is affected the same way.

But those caveats aside, the effects of the air pollution from these facilities are obvious and they impact a large proportion of the people exposed. And I believe they would not be tolerated by people who have more political clout and ability to harness resources to protect themselves. I believe that this system exists as it does currently because historically eastern North Carolina is part of what's called the black belt. Many people descended from slaves who worked on plantations in that region prior to the civil war.

It's politically disenfranchised, there's a great deal of intimidation that dates back to slavery days and through (Jim Crow) and lynching and school segregation which is still a great problem. And the population there has not had the resources and has also had the historical exploitation and oppression that's preventing them from being able to insist upon having decent environmental regulations that would protect them from pollutants that would not be tolerated by others. So I think you know that's what we have is as a system would not exist if eastern North Carolina was similarly demographically and economically to for example the part of the state that I live in the Piedmont in The Research Triangle area or Charlotte or Winston Salem or Greensboro or other areas that are better off.

The industry was only able to flourish in this manner because of the characteristics of the population in eastern North Carolina. I hope that addresses your question. I realize it may be broader but.

(Mary):

Yes, I think it does. We did have a question about in your – in your declaration you mentioned that in Iowa the lagoons are underneath facilities. And we were just wondering you know I mean I can imagine why they were not done in North Carolina but if you would like to expand on that statement for us. Like what you know what is it – can you talk about it and how is it that that it didn't develop this way in North Carolina?

Steve Wing: Well one facet is that the water tables in eastern North Carolina are very high. So the org waste lagoons in North Carolina store waste to some degree below ground but also above ground because the earthen dams are mounded up above the grade of the land and that's a factor. There's also a factor of temperature you know the climate's different. There may be other reasons. I'm really not familiar with how the engineering difference is developed between the two states in detail.

(Mary): OK. Did you all have any other questions? Is there anything else that you would like to add? I'm going to ask in a minute. Is there anything else that you would like to ask, I mean like to say Dr. Wing?

Steve Wing: Well, you know I realize that you have research papers and that that's not really the subject matter of your interest today. But since we're on the phone I did want to mention one thing about some more recent studies that as far as how the studies are designed, the older studies tend to be what we call cross sectional studies where exposed populations meaning people who are living or attending schools near these facilities are compared to other people who live or attend school farther away. Those studies are common and widely used – it's a widely used design in epidemiology. But they are always subject to questions about how comparable the study population the exposed and unexposed populations are. And because there's no follow up in time they're – it's always possible that the people who have the illness had it before they were exposed because we don't follow them up.

But all the more recent studies they come from a design that is not so often used in epidemiology but it's a very strong design. And those are the studies in which we measure the pollutants in people's neighborhoods and we show that their symptoms increased when the pollutant levels increased. And I mean by their symptoms their ability to engage in daily activities of daily living. Their mental health, their physical health including symptoms and blood pressure and so on and lung function.

And those studies rather than comparing people who live next to the hog operations to people who live elsewhere, we compared each person to her or himself meaning that they were their experiences when the pollutants were

present compared to the same person's experience when the pollutants were lower or absent. And it means not only do we have certainty about the timing that the effects occur after the exposures but the other factors that might differ between exposing populations and unexposed populations in cross sectional studies. Things like diet, exercise, occupation, body weight and so on, medical history. Those are not factors in these more recent studies. And this is something that has been pointed out as a great strength of our more recent work that it really does resolve some of the questions that might be raised about the earlier studies.

I just wanted you to be aware of that.

(Mary): Thank you, yes. I actually had noticed that but I can't remember which study it was where it was explained, you explained that.

Steve Wing: Oh good. OK, well I apologize for ...

(Mary): No I'm sort of going through I'm trying to remember which study it was that I was reading that had that explanation about how you were doing a (inaudible). So but thank you for you know pointing that out and pointing out the idea about the difference between the older studies and the newer ones and ...

(Marianne): Do you all have more questions? There are a couple of things that I wanted to make sure we got out but if you have more questions I'll wait.

(Mary): No. The only question that we had (Marianne) and I think it's probably it may be better addressed to you I don't know and it might be a quickie which is we were reading the change.org petition that **Citizen Name / Ex. 6** had written and in it she mentions that even when she that she smells the odors inside her house, even when she shuts the windows as the health department has advised. And so we were trying to – we've been looking around trying to figure out what you know where that came from the health department has advised. Like do you know what that means what that advisory is, how it comes out, how it got to her, what she's talking about?

So it's not necessarily for Dr. Wing unless he happens to know the answer but which health department even?

(Marianne): I don't know off the top. (Elizabeth), do you know off the top of your head?

(Elizabeth): No.

(Mary): OK. Well then ...

(Marianne): We can ask Citizen Name / Ex. 6 ough and you could interview Citizen Name / Ex. 6 I'll also look back at her declaration to see if there's any more detail. I assume you've already done that.

(Mary): Yes, we did. Anyway just it was just if you happened to know the answer off the top of your head otherwise yes, we can go down that path. OK, so you wanted to make sure some things got brought out (Marianne)?

(Marianne): Yes. And frankly I thought there were going to be more questions and if we had more time I think it would be important to ask more about some of Dr. Wing's studies. We talked a little bit about the methodology of the 2000 study as compared to the you know the disparities analyses. These are some of the seminal studies in the area and we have the good fortune I suppose of having them on the you know the particular facilities at issue here.

So sometimes when looking at whether facilities have an impact where by analogy or trying to say well something that happened somewhere else how does it affect here, there's a you know 2006 asthma symptoms study, the 2006 race poverty and potential exposure of middle school students, 2008 air pollution and odor, 2013 air pollution ISOs and blood pressure. Some of this was really path breaking community based participatory research. I also thought it could be helpful to get if you had any questions about the scope of Dr. Wing's expertise, you know to some degree the CV speaks for itself but I want to make – you know if time permitted I would want to make sure that if you had any questions that would be in your record.

But let me – let me just start with a couple of things that we didn't touch on at all that might not be as self evident. We talked about exhibit two which is the letter to (Christine Lawson) from December 2013 and Steve you asked about in that letter asked for the permanent list to create records to document

environmental and health impact. Was there – there was a large question about did you get any response at all but do you know are there more records available now? Was there any response to that particular request? What happened with that and why did you focus on it?

Steve Wing: I'm not aware that there have been any changes in the availability of records. At the time I was particularly looking for information on daily spring times and amounts of the application of liquid manure broadcast into the air in hopes that we might be able to use that information in our studies. But unfortunately I haven't been in a position to follow up on that.

(Marianne): We talked a little bit earlier about I think the whole – this interview started with why did you focus on swine and you mentioned the historical origins. Can you share – I guess I have two questions about the relationship between swine and poultry just to make sure this is discussed explicitly. One is the different geographic location of swine and poultry even as the poultry industry has expanded. So that's my first question.

Can you describe why we don't have perfect information about dry litter facilities for starters but also to the extent we know where those facilities are located to what degree they're co-located and to what degree they're in different places. And then I want to talk – ask a little bit about cumulative impacts in co-location.

Steve Wing: Well because the turkey and chicken facilities the broiler facilities are not permitted by the department of environment we don't have records of their locations. My understanding is that this goes back in part to post 9/11 rules that supposedly protect these facility's locations because of concerns from bio terrorism but I'm not able to rehearse in detail the rationale. But in any case we don't have latitude, longitude coordinates for the poultry facilities except for those few that use liquid waste management systems and therefore trigger the DEQ permitting.

On their geographic location just by county or by some remote imaging work that's being done there are – there is a concentration in eastern North Carolina which includes the two top turkey dense counties in the nation which are also

in the top hog dense counties in the nation so there's clearly co-location. But there's also another area of fairly intense poultry production in the western Piedmont of the state in rural areas between The Research Triangle and Charlotte and north and south of that line and these are dry litter operations again, they're not liquid waste facilities. I think where they are co-located where the swine and poultry facilities are co-located they definitely have a potential for accumulative impact because it means that there can be animal waste in the air blown from more directions.

And the poultry waste is actually harder to track as far as its spatial impact because being dry it can be transported some distance before it's applied to land. And it's that land application process that results in the most acute release of particles because the dry litter is broadcast from the newer spreaders but it doesn't necessarily occur at the site of the CAFO, at the site of the buildings. So there is that's another issue that makes for complexity in conducting research on the spatial pattern of the impact.

(Marianne): Is there – speaking as an epidemiologist or from your experience, is there any way of taking account of the cumulative impact of poultry? If you were looking at the impact of these hog facilities in eastern North Carolina is there a way you could take account of the cumulative impact or you know assess multiple exposures and/or assess also other indicators of vulnerability in the population?

Steve Wing: Yes. In fact this is the subject of a grant application that we submitted to NIEHS in which we proposed to collect particles in people's neighborhoods where they live both swine and poultry and to analyze genetic markers in the particle samples for DNA from bacteria that only live in the gut of swine and other bacteria that only live in the guts of poultry so that we could partition the particle mass present in the neighborhood into the proportion that comes from swine versus poultry. And then look at the impacts on people's health and quality of life when only swine is present, when only poultry is present and when they are both present together compared to when neither are present.

So we actually have proposed a method to do just what you asked about. Unfortunately that proposal I have to say was not funded. I submitted it around the same time that I wrote the letter to (Christine Lawson). And sometimes I fear that there may be a connection between my having violated one of their rules and the fate of our proposal but I don't have any evidence of that.

(Marianne): In the absence of that new research is there – it doesn't have to be a you know I think what you've called a cookbook method of the assessing multiple exposures but how would you take that into account or could you take cumulative impacts or ...

Steve Wing: Well one thing I would do is I would refer to testimony from residents which I think in my experience much of our formal research has validated what people have reported about their experiences. So we began – I began all this research being informed by the testimony of residents. And one of the things I paid attention to was that the stories people told, the accounts of their experiences were similar between people in different places that don't know each other that suggested to me that they weren't making it up. And there's plenty of testimony about the experience of living near both swine and poultry and I would begin there.

(Marianne): (Elizabeth), do you have any questions you want to ask? I want to make sure we are able to wrap up?

(Elizabeth): No, I think that does it. Thank you so much Steve.

(Mary): Anybody else have any last words (Marianne) or Dr. Wing?

(Marianne): Well my – this is (Marianne) and you know thank you to Dr. Wing. And we will try to collect information and there were a few things that came up during the course of the conversation and we'll try to get that. And if you have any additional questions (Mary) and (JerylJeryl) and others you know feel free to let me know.

(Mary): Yes. And once again Dr. Wing, thank you very much for your time and ...

Steve Wing: You're welcome. This is something that I believe is very important. I think your investigation holds out some hope for many thousands of people who are living with this pollution and we look forward to the outcome of your investigation.

(Marianne): Can I suggest one more question and this is for Steve? I'm aware that this was a complaint that you as a researcher and as a board member of North Carolina Environmental Justice network thought should be brought. Could you share with the office of civil rights why you thought it was important to bring it?

Steve Wing: To bring a complaint?

(Marianne): Yes.

Steve Wing: Well, I feel that as I understand the history that Title VI has been used in the past to address disparities in access to hospitals and schools and public transportation and other public facilities. And therefore there's a track record of bringing about some advancement of the persistent racial inequalities that exist in the United States through this law. But we haven't seen it impact the environment and we still have serious issues with environmental racism and environmental inequality.

And I think often it's very difficult for in the case where the pollution comes from corporate entities it's very difficult to get them to change directly. But the appropriate – one appropriate way to bring about change is when there is a state agency that actually is responsible for setting the guidelines for these polluters. And it's not just about one facility at a time that might violate the Clean Water Act or the clean – or some other rule. It's about the system and permitting.

And in this case as I tried to explain earlier, I don't think we would have this system in North Carolina were it not for the presence of the black belt and its historical exploitation and lack of political and economic resources and its history of racial intimidation. So I think it's a very appropriate approach and it deals with fundamental issues of responsibility and holding our government accountable to democratic principles.

(Marianne): Thanks.

(Mary): Thank you. OK, all right well thank you very much again Dr. Wing.

Steve Wing: You're welcome. I'm happy to answer further questions if they come up later.

(Mary): Great. Thank you so much.

Steve Wing: You're welcome and bye, bye.

(Mary): All right bye, bye. Thank you.

END